VETERINARY MEDICINE

March, 1933

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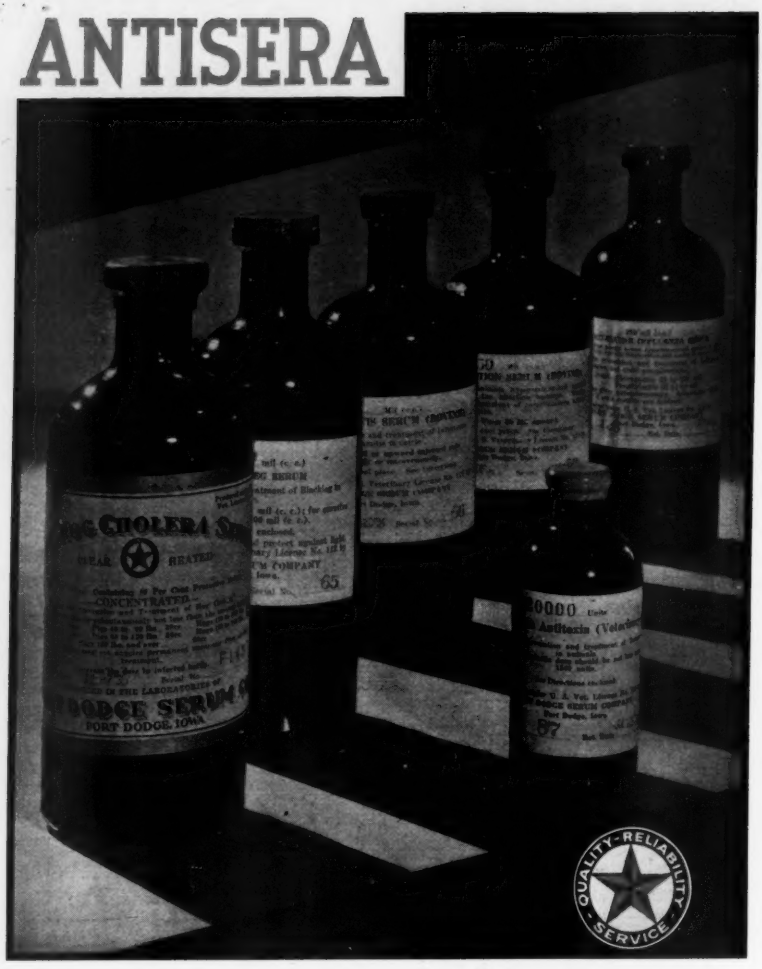

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The first store dealing exclusively in drugs was opened in Wetzlar, Germany, in 1233.

Platt in a study of the literature on the subject found 19 synonyms for pregnancy disease of ewes in more or less common use; many of them primarily intended as descriptions of the disease or of its occurrence.

A hormone from the cortex of the adrenal glands has been shown to be necessary to the maintenance of a normal volume of blood. An injury to the adrenal cortex produces symptoms indistinguishable from shock and it is deduced that the proper treatment for shock is the administration of the adrenal cortex hormone.

At the Washington Agricultural Experiment Station it was found that cannibalism in chickens can be satisfactorily controlled by the use of ruby lights in brooder houses, in battery brooders and in fattening stations. Painting the windows of the houses with red lacquer was also found to give satisfactory results in the control of this habit.

Eating *Actinea odorata,* bitter rubber weed, a plant belonging to the aster family, was responsible for the poisoning and death of more than 75,000 sheep in an area of 6,000 square miles during the winters of 1929-30 and 1930-31. The failure of grass on the range and resultant semi-starvation of the sheep caused them to eat the weed.

A new analgesic dyhydromorphinone hydrochloride is made from morphine hydrochloride with the help of a catalytic agent which causes it to combine with water. It gives more relief from pain than morphine. It is recommended for hopeless cancer cases.

In July 1919, top hogs sold on the Chicago market for $23.60 per cwt. In December 1932, top hogs sold for $3.25 per cwt, the lowest point in 54 years. Swift & Company's annual report shows a loss for the first time in 21 years.

Investigators at the University of Wisconsin have determined the part that copper plays in the treatment of secondary anemia. The presence of copper is not necessary, as was at first supposed, for the assimilation of iron, but is necessary for its conversion into hemoglobin. Also upsetting old theories it was found that inorganic iron is more readily utilized by the body than organic iron. The investigators conclude that common iron carbonate with a small, a very small, amount of copper sulphate will prove more efficacious in the treatment of anemia than the complex and expensive forms of iron now in use. It has not been determined whether young pigs get anything of value other than iron and copper from eating dirt (or sod) which, as has been amply demonstrated, prevents the development of anemia in these animals.

I came in with milk and I guess I'll go out with it. It is the only balanced ration—balanced by the Great Chemist who is far away.—Edison.

"Complete success" in protecting dogs and other animals against distemper is claimed in the final report of the "Field" Distemper Council.

As a result of an observation carried out at the U. S. Department of Agriculture Experimental Farm at Beltsville, Maryland, 1927-30 inclusive, it was concluded that the tendency to produce an excess of one or the other sex in the domestic fowl is not inherited.

Milk contains an abundance of protein, fat, carbo-hydrate and inorganic salts; its unique proteins are not only of superior value when used alone, but are also especially adapted to supplement the deficiences of the proteins of the cereals that form so large a part of the daily ration of mankind.

Traverse Colantha Walker, a Holstein cow, was calved in 1916 and died in 1932. In nine lactations she produced a total of 200,114 pounds of milk—7,526 pounds of butter fat. This is sufficient milk to rear 1,000 calves to weaning age. A stone monument has been erected for her at Traverse City, Michigan. She was proclaimed the life-time champion of the Holstein breed.

Milk ordinarily contains only small amounts of vitamin D, but when this is increased by supplementing the cow's ration with a source of vitamin D—irradiated yeast—the milk acquires the rickets preventing quality of this vitamin. The amount of vitamin D that must be fed cows to give their milk rickets preventing potency has been worked out by J. G. Hardenbergh and L. T. Wilson of the Walker-Gordon Laboratory Company. The production of such special milk must be under adequate supervision to insure its reliability.

Conclusions drawn by the U. S. Department of Agriculture investigators have shown that with free access to water, cows produced 2.8 per cent more milk and 2.1 per cent more butterfat than when permitted to drink twice a day. When watered twice daily they produced 1 per cent more milk and 1.4 per cent more butterfat than when drinking once daily. Dry feed calls for more water than succulent feed.

In a study by the U. S. Department of Agriculture, Bureau of Dairy Industry, it was found that when cows are fed grain with either timothy or alfalfa hay as the sole roughage, they are likely to consume small quantities of roughage and to have periods of digestive disturbances and lack of appetite during which they show a decided distaste for any kind of hay they have been eating. Feeding the other kind of hay under such conditions was usually followed by rapid recovery. Feeding high quality alfalfa and timothy hay in such a manner that the cows could consume as much of each as they wished, resulted in a larger consumption of hay and in a higher milk production than when alfalfa hay was fed as the sole roughage.

Crystal violet, brilliant green, acriflavine, and azamine have been studied by the New York Agricultural Experiment Station for the treatment of clinical and sub-clinical mastitis. Treatment was by oral administration, by intravenous injection, and by udder inflation. Treatment by the last method required the use of an isotonic solution as a solvent for the dye. A solution of 0.12% sodium chloride and 3.5% lactose produced a minimum reaction. Crystal violet, brilliant green, and acriflavine did not prove effective against mastitis. Azamine had little effect on the udder flora when administered orally or injected intravenously, but udder inflations gave considerable promise. Field tests indicated that a number of cases were definitely benefited by the use of the latter treatment.

Malaria takes 2,000,000 lives throughout the world each year.

Epinephrine, a secretion of the superenal glands of man, has been found to be produced also by the big warts on the side of a toad's head.

Proficiency in the control of disease implies first of all a profound knowledge of cause, for without this our labors are in vain and our efforts misdirected. And having defined the cause, with an exactitude which is an indispensable factor, preventable and remedial measures become scientifically possible.—Sir John Moore.

In recent years in the United States diphtheria has maintained a death rate 70 times as high as small pox. Now diphtheria is successfully prevented by the use of toxoid and we may expect to see death from this disease fall to the low level of small pox in the course of time.

Sixteen persons died in Illinois during the past year from injuries inflicted by horses and mules, nine deaths resulting from kicks and seven from run-away accidents. Vicious bulls caused seven deaths and a kicking steer at the Chicago Stock Yards killed one man. Two persons were mortally wounded by milk cows. Dogs caused six deaths, two people dying from having been bitten severely and four from rabies contracted through bites of rabid dogs.

In 1790 there were only five cities in the United States having a population of more than 8,000; now there are eight cities with populations in excess of 800,000. The percentage of persons 50 years of age and over has doubled since 1850. In 1841 the mortality rate in Chicago was 70 per thousand. Now it is under 12. In 1857, the mortality in Chicago from malaria was 11 per 1,000 and in 1880 it was 22 per 1,000 from small pox. Neither disease causes a measurable mortality in Chicago now.

Our research workers are the forgers of our weapons of defense and offense against the inroads of bacterial disease and for the promotion of the appropriate preventive agency and curative remedy.—Sir John Moore.

Hoffman reports a case of infestation of a human being with a pair of *Syngamus laryngeus,* normally a parasite of cattle. The infestation was contracted during a visit to a farm and caused a more or less continuous cough. This is the fourth record of this parasite being found in man.

Queen bees develop their full maternal powers which makes them the mothers of their hives apparently because they are fed during infancy on food containing the fertility vitamin E. Their young sisters in the brood comb denied this essential food element, grow up into practically sexless worker bees—"old maid" bees—incapable of producing a useful offspring even in emergencies.—*Science.*

To meet more adequately the circumstances of persons who are not in a position to pay veterinary surgeons' fees in whole or in part, a very comprehensive scheme has been inaugurated by the National Veterinary Medical Association and its Divisions throughout Great Britain and Ireland, in conjunction with the Royal Society for the Prevention of Cruelty to Animals and its branches in various cities and towns, whereby treatment to sick and injured animals may be administered only by qualified and registered veterinary surgeons. One can realize the necessity for such a movement being undertaken by a well-endowed humane organization and appreciate the desire to avoid the haphazard diagnosis and treatment of animals by unqualified persons, thus assuring to all dumb creatures that skilled and enlightened attention which only the specially trained veterinary practitioner can render. It sets an example which other philanthropic bodies charged with kindness to animals might copy with advantage.—Sir John Moore.

THE COUNTY AGENT PROBLEM

Many have thought since County Agents are supported by Federal funds matched by state appropriations and since it is not discretionary with County Boards to provide funds for the maintenance of county agent offices but mandatory under the state law for them to do so when petitioned by a few farmers, that the problem is not solvable locally but must be reached by dissuading the Congress from continuing appropriations for Agricultural Extension. (That Agricultural Extension is a good term in view of the preaching of the Secretary of Agriculture to farmers to retrench in crop production.)

Beyond any doubt it was the plan of the Agricultural Extension Service to place it beyond the pale of local sentiment and to arrange for its perpetuation regardless of the wishes of the communities "served." The ease with which Agricultural Extension Service may be foisted upon a county that doesn't want it and the "mouse trap" law of Nebraska and similar laws elsewhere, making it as difficult as possible without absolutely prohibiting, dispensing with the county agent seem conclusive evidence of this intent. It is submitted that no government bureau with honest intentions of resting its case upon the service it rendered would have fostered or been a party to so iniquitous legislation as the Nebraska "mouse trap" law or similar, though not quite so rank, legislation elsewhere.

Notwithstanding the seeming insuperable legal difficulties to dispensing with the county agent nuisance in Nebraska, public spirited citizens in that state were successful in submitting the proposition to get rid of the county agent to a vote in the general election last fall in eleven counties. And the county agent lost in just 100% of these counties, in most of them by something like a two to one vote of the citizens. Whereas there were 44 county agents in Nebraska heretofore, there are only 33 now. The job is 25% finished.

TAXES!

Taxes! Taxes!

The Eternal Question of How to Save Taxes

READ HOW TO START DOING SOMETHING TOWARDS CUTTING TAXES—NOT JUST TALKING ABOUT THEM.

For the past twelve years Fillmore County taxpayers have appropriated to the Farm Bureau $3,500.00 a year, or a total of $42,000.00. The Farm Bureau supporters assume that what the State of Nebraska and the Federal Government pay towards the support of the Farm Bureau costs the taxpayers of Fillmore County nothing. That, of course, is wrong. All of us pay State and Federal taxes. In addition to the $42,000.00 put up by the taxpayers of Fillmore County, Nebraska, the State and Federal Governments have appriated an additional $42,000.00 to the Farm Bureau, which makes the TOTAL COSTS OF THIS BUREAU FOR THE PAST TWELVE YEARS APPROXIMATELY $84,000.00.

Whenever you start talking about eliminating some fifth wheel to the Government, some useless bureau or unnecessary officer, the officials who are involved immediately demonstrate by figures, first, that what it costs each individual taxpayer is but a little bit, and next, they bring out a number of high-powered speakers (who are likewise on the payroll) to prove beyond any question of a doubt that all the hogs will die of cholera; that all the school children will die of measles and mumps, and the bees will quit making honey, if this or that particular department of government is eliminated. Calamity will be upon us right then and there.

NOW THE SIMPLE TRUTH IS THAT WE CAN NEVER START REDUCING TAXES UNLESS WE START ABOLISHING OFFICIALS THAT WE CAN DO WITHOUT. It is not a question as to whether or not the Farm Bureau is desirable or undesirable. It is a question as to whether or not, with 8c a bushel corn and 25c a bushel wheat, we can afford the luxury of a $7,000.00 a year County Farm Bureau? If you, Mr. Taxpayer, feel that you can afford that luxury, the thing for you to do is to vote "Yes" upon the proposition that will be submitted to you at the election November 8.

On the other hand, if you feel that we had better begin to lop off here and there and wherever we can, those functions of government which are not absolutely essential and necessary, this is a mighty good place for you to start and vote NO.

Fillmore County Taxpayers

Dr. J. N. Barber, Exeter, Nebraska, was instrumental in getting the proposition to dispense with the county agent on the ballot in Filmore County. With the help of an attorney he prepared a proper petition for signature by the necessary number of farmers. The signatures were secured almost in a day by eager volunteers. Doctor Barber then had a few hundred 7x10 inch hand bills printed and posted them at prominent road crossings, in store windows and other public places. His total outlay in cash was only $20.00. The vote was overwhelmingly against the county agent, although he and favored members of the Farm Bureau put up a strenuous fight, claiming credit for the 4-H Clubs, for which he was in no sense responsible, and cow testing associations, with which he had nothing to do.

In South Dakota there are fewer legal obstacles to counties ridding themselves of county agents than there are in Nebraska, and the good work has made

greater progress there. Whereas not long ago approximately 50 South Dakota counties had county agents, only 15 are left now; nine of them going by the board in the last election almost solely as a result of the initiation of public spirited veterinarians. Like Nebraska, South Dakota voted on the proposition to dispense with county agents in 11 counties at the November election. The county agent lost overwhelmingly in nine counties but won by narrow margins in two counties. There is a lesson in the loss of these two counties for veterinarians everywhere. In the campaign against the county agent no attention was paid to the cities. The result was, although the vote was two to one against the county agent in all rural precincts in Brown County, he carried Aberdeen precincts by an even greater vote and won by a majority of 42 in the 12,500 votes cast. In Beadle County the results were similar, the county agent carrying the city of Huron by sufficient majority to overcome his loss in the remainder of the county.

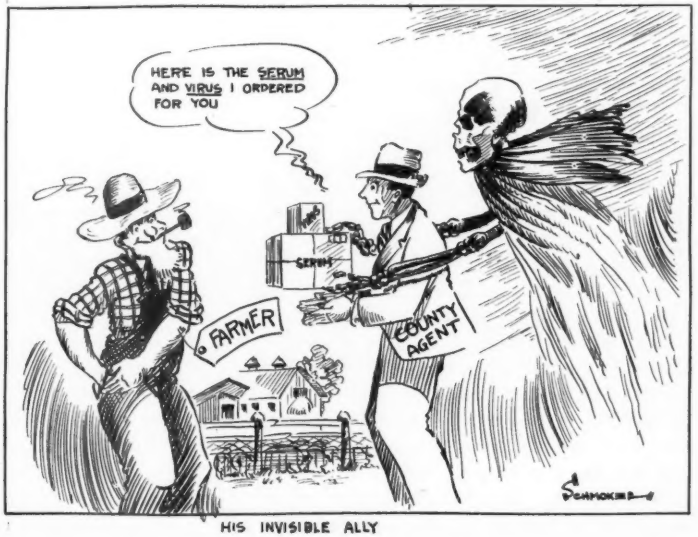
The success of Nebraska and South Dakota and the progress that has been made in a number of other states shows that no veterinarian need wait for some committee of his state or national association to solve his county agent problem for him by efforts in the state legislature or in Congress. He can take the matter locally in his own hands with more than a fifty-fifty chance of ridding his county of an expensive and unnecessary official and serving at the same time the best interests of agriculture, the taxpayer and himself.

Dr. G. O. Handley, Eaton, Ohio, sends a striking comparison:

The normal salaries for the following Federal officials for a year and for a period of four years are:

	Rate	One Year	Four Years
President	$75,000	$75,000	$300,000
Vice-President ...	15,000	15,000	60,000
96 Senators	10,000	960,000	3,840,000
Speaker, House of Representatives.	15,000	15,000	60,000
434 Representatives	10,000	4,340,000	17,390,000
13 Ambassadors..	17,500	227,500	910,000
2 Ambassadors ..	12,000	24,000	96,000
37 Ambassadors..	10,000	370,000	1,480,000
5 Ambassadors ..	6,000	30,000	120,000
33 Ambassadors' Secretaries	6,000	198,000	792,000
Total		$6,254,500	$25,018,000

It costs the Federal, state and county governments approximately $25,100.000 each year to maintain the county agents and home economic agents, or more than the salaries of the President, Vice-President, all the Senators, all the members of the House of Representatives and all the Ambassadors and their secretaries for the four years of an administration.



HIS INVISIBLE ALLY

The Germicidal Efficiency of Chlorine and Chlorine Compounds

By ERNEST C. McCULLOCH, Madison, Wisconsin
Departments of Agricultural Bacteriology and Veterinary Science, University of Wisconsin

THE public is beginning to regard the local veterinarian as the logical man in the community to lead in matters which concern milk and meat inspection. Too frequently, the veterinarian finds that he is not familiar with the practices that have developed in these industries. Moreover, all authorities are not in accord regarding many important practices, and what is accepted as the best practice in one state may even be forbidden by law in an adjoining state. The veterinarian who is interested in this type of work must obtain the facts, analyze them and draw his own conclusions. This is not always easy, and frequently involves the reading and evaluating of a great deal of literature. The statements of individuals who have certain equipment to sell may give one a rather incomplete idea of the whole situation. One of the newer developments that is of interest to every veterinarian is the use of chlorine and the chlorine compounds as sterilizing agents.

Chlorine is now more widely used than all other disinfectants. It is no exaggeration to state that each day there are more bacteria killed, as well as a greater volume of material disinfected, by chlorine than by all other chemical agents over a period of years. This wide use is due to the ability of small amounts of chlorine to destroy the pathogenic microorganisms in large volumes of water. This it does without influencing the taste of the water or endangering the health of the consumers. So great is the germicidal strength of chlorine that as little as one part of chlorine in five to ten million parts of water is ample to protect against any ordinary degree of pollution. The greatest part of this chlorine is expended in the oxidation and chlorination of bacteria and other organic material in the water, and remains in the form of the comparatively inert chlorides. To one not accustomed to think in the terms of measurement as used in the laboratory, it may appear fictitious and impossible that any agent could exert a germicidal action in such small concentrations. A little calculation, however, shows that this is not at all unreasonable, and we wonder why phenol is considered such an effective germicide when dilutions of 1:300 cease to be antiseptic.

If water contains 200 typhoid organisms per cubic centimeter, ten million cubic centimeters of this water would contain two billion of these organisms. Assuming that the average typhoid organism is two microns long and 0.7 microns in diameter, it would require 1,000,000,000,000 to occupy a cubic centimeter or to weigh approximately a gram. The two billion organisms in the ten million cubic centimeters of water would occupy but one-five hundredth of a cubic centimeter and weigh but one-five hundredth of a gram. The gram of chlorine necessary to sterilize this amount of water would therefore be equal to five hundred times the weight of the bacteria to be killed. Moreover, the bacteria cells are over eighty per cent water, so it becomes obvious that even small doses of chlorine are ample for the chlorination or oxidation of the bacterial protoplasm.

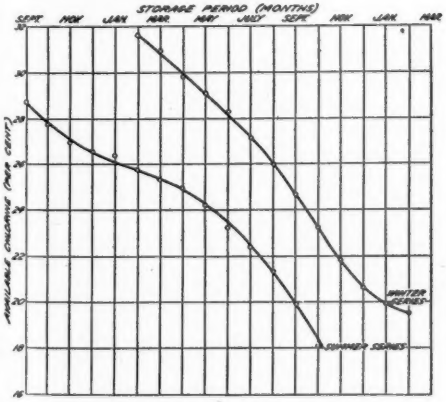
There is still lack of complete agreement as to the exact mechanism by which chlorine kills bacteria. For many years it was assumed that the action was entirely oxidation, the active chlorine combining with the hydrogen of the water to form hydrochloric acid and in this way liberating nascent oxygen. It is known that nascent oxygen is a very active germicide. Certainly, oxida-

tion does play a part in the destruction of bacteria exposed to solutions containing available chlorine, but there is an increasing amount of evidence which points to the direct chlorination of the plasma of the bacterial cell as the most important mechanism in the destruction of microorganisms by chlorine.

It is not surprising that such a powerful germicide should find its way into medicine as well as the dairy and food industries. There are several chlorine products, and each has its place in sterilization and disinfection. While confusing and often conflicting claims have been made concerning these products, it is not difficult to place them into groups. Each group will be found to have its disadvantages as well as its advantages. No one type of chlorine compound is equally satisfactory for all uses, and the very characteristics that may make one type of compound almost ideal for a certain type of disinfection, may make it practically worthless when different results are desired.

The veterinarian is doubtless familiar with the use of chlorine as a surgical disinfectant. Therefore this important application of chlorine and the chlorine compounds to medicine will be omitted from this paper.

THE DETERIORATION OF CHLORINATED LIME .U. S. D. A. BULLETIN 1389



Average loss of available chlorine in summer-packed and winter-packed chlorinated lime stored for 16 months.

Liquefied Chlorine Gas

The most economical way to purchase chlorine is in the form of cylinders of the compressed gas, although this is practicable only where comparatively large amounts of chlorine are used. For the chlorination of small water supplies, the gaseous chlorine is available in cylinders which contain one hundred fifty pounds of the gas. Larger water as well as sewage treatment plants purchase chlorine in larger containers which contain one ton or even fifteen tons of the gas. Rather elaborate chlorinators are used to insure the proper application of the chlorine. While chlorine gas is to be preferred for the treatment of municipal water supplies, it is not applicable to the dairy and food industries.

Chlorinated Lime

Before economical methods had been devised to ship chlorine gas, chlorinated lime was the usual commercial source of chlorine. The chlorine is rather loosely held in combination as $Ca\ O\ Cl_2$ in the presence of varying amounts of hydrated lime. For many years chlorinated lime was the only practical source of chlorine and it played an important part in the development of aseptic surgery and in the early purification of water supplies. When fresh packed, chlorinated lime contains approximately thirty per cent. of available chlorine, but it is subject to rather rapid deterioration.

Since the introduction of other and more stable chlorine compounds, the use of chlorinated lime has been abandoned to a large extent.

The Hypochlorites

The hypochlorites may conveniently be divided into three rather comprehensive groups:

1. Compounds in which an extraordinary amount of chlorine has been stabilized as calcium or sodium hypochlorite. These are powders and for the most part are readily soluble in water.

2. Stabilized solutions of sodium hypochlorite in which the degree of alkalinity is reasonably low.

3. Stabilized solutions of sodium hypo-

chlorite in which the degree of alkalinity is relatively high.

The hypochlorite powders carry a large amount of available chlorine either as stabilized hypochlorites of calcium or sodium. Others contain small amounts of hypochlorite in the water of crystallization of trisodium phosphate. As a general rule the hypochlorites of calcium and sodium will yield upward of sixty per cent available chlorine. While a more costly source of available chlorine than chlorine gas, they are not appreciably more expensive as a source of chlorine than chlorinated lime, and they are very much more stable and hence more reliable. They are less expensive than the commercially prepared hypochlorite solutions.

The stabilized solutions of calcium and sodium hypochlorite are by far the most convenient source of available chlorine. True, chlorine purchased in this form is more expensive than when purchased in some of the other preparations, but the greater convenience and lack of waste more than compensate when only moderate amounts of chlorine are to be used. When these solutions are properly prepared, they are remarkably stable and the desired dilution can be made instantly by merely adding the proper amount of the solution to a given quantity of wash or rinse water. Several factors must be controlled in order to utilize the hypochlorites to the greatest advantage. In the dairy and food industries, the hypochlorites find their greatest use in the so-called sterilizing rinse, in which a dilute solution of hypochlorite is used to rinse the separator, milk can or food container. By its almost instantaneous germicidal action, the hypochlorite solution is depended on to reduce the bacterial population in the container to a point where it can no longer be a factor in the deterioration of the milk or other food material. Obviously this is not "sterilization" as sterilization is the destruction of all life. This is neither obtained nor sought in these industries, but the term "sterilization" has become so firmly established in these industries that it has taken on an especial meaning. The great object in the use of the sterilizing rinse is rapid germicidal action. The rapidity of the germicidal action does not depend upon the amount of available chlorine, as has been stated by certain manufacturers, but upon the concentration of hypochlorous acid. Now, there cannot be hypochlorous acid without some available chlorine, but once the available chlorine is present, the proportion that will be present in the form of the germicidal hypochlorous acid will depend upon the degree of alkalinity. If the solution is alkaline, the proportion of hypochlorous acid will be low and the germicidal action will be correspondingly slow. If the hypochlorite is very low in alkalinity, practically all of the available chlorine will be present in the form of hypochlorous acid and the germicidal action will be almost instantaneous. A concentration of 0.2 parts per million of available chlorine in the absence of excessive alkalinity is a more effective germicide than ten times that amount in a moderately alkaline solution.

Unfortunately, the ability to corrode certain metals is also a function of the hypochlorous acid. Likewise, the desired stability also depends on preventing too much of the chlorine being present in the form of hypochlorous acid.

The proper balance between the rate of germicidal action, stability and lack of corrosive action on metals has given the manufacturers of stabilized hypochlorites a great deal of concern. Some have tried to solve the problem by producing a very alkaline product which is very stable and non-corrosive to all metals except aluminum, where the alkalinity in itself is damaging. These products reveal the proper amount of available chlorine when the usual chemical tests are made. Bacteriological tests, however, demonstrate that these products are so extremely stable that the chlorine only slowly forms hypochlorous acid and thus becomes available as a disinfectant. The short time of exposure obtained when these compounds are actually used is not sufficient to allow them to exert their germicidal action, and the greater part of the available chlorine in these compounds is wasted.

The Hypochlorites as Preservatives

Periodically the hypochlorites have been suggested as possible preservatives for foods. Occasionally the objection is still heard that their use in controlling the contamination from separators, milking machines or milk pails constitutes the addition of a chemical preservative to the milk. Nothing could be more absurd. It is impossible to add sufficient hypochlorite to milk or milk products to exert even an antiseptic action without making the milk undrinkable. All of the available chlorine would dissipate itself in the attempt to oxidize the organic material and, except for the secondary chloramines formed in reaction with the milk, would not be germicidal.

Chemical Sterilization

The lack of stability that the hypochlorites exhibit in the presence of organic matter is at once an advantage and a disadvantage. Because they disintegrate rapidly in the presence of organic matter, they can be used safely to disinfect water supplies and as chemical sterilizing agents in the food and dairy industries. This same property makes them ineffective on dirty surfaces and in the presence of considerable amounts of organic material. Therefore they cannot be used as substitute for decent cleanliness. A great difference exists, however, between decent cleanliness and bacteriological cleanliness. A milk separator may be washed clean, rinsed in clean water and placed in clean surroundings; and yet after a warm damp day that milk separator will be capable of adding untold millions of bacteria to the milk. The situation with milk pails, cans and milking machines is very similar. A rinse with a hypochlorite solution will add bacteriological cleanliness to the decent degree of cleanliness that has already been obtained. Attempts to sterilize dirty surfaces by the hypochlorites will always result in failure.

Heat vs. Chemical Sterilization

The controversy over the relative merits of heat and chemical sterilization is by no means a new one. Few who have studied the problem doubt that heat sterilization is perfectly satisfactory from the theoretical standpoint. Pails, cans and separator parts that are washed clean and then placed in a suitable sterilizer and actually steamed with live steam, are very satisfactory from a bacteriological standpoint. Several practical considerations spoil this lovely picture. In the first place, the degree of steaming necessary to give the best results is far more than the rubber inflations of the milking machine will tolerate for any extended period. The second is that this must be done after each milking, to be effective. If done only once a day, the number of bacteria that may develop between the evening and morning milking will be sufficient to stagger the imagination. In addition, how many dairymen possess a suitable pressure steam sterilizer, and of those that do have such equipment, how many are willing to spend the necessary time to insure steam sterilization twice each day? I think we know the answer. The tea kettle full of hot, not boiling, water that is poured over the milk utensils under the name of heat sterilization is only a gesture. Doubtless the bacteria appreciate the warm bath.

Under practical conditions chemical sterilization is the only satisfactory answer to the problem that has been advanced.

Home Made vs. Commercial Hypochlorite Solutions

At first glance it would appear that the hypochlorite solutions could be made economically on the farm or by the local druggist. Several difficulties have been experienced where this has been tried. In the first place, the source of chlorine has given difficulty. The purchase of the necessary equipment to use chlorine gas as the source of chlorine, together with the necessary chemical equipment to standardize the solution, is not practical. To do so would place the farmer or druggist in the manufacturing business, and the manufacture of stabilized solutions of sodium hypochlorite is beset with more technical problems than can be mentioned in the short space available here. Just to mention one of the difficulties, if the hypochlorite is even allowed to contact iron or certain other metals the minute amount of the metallic salts dissolved

acts as a catalyst and causes the solution to decompose. The use of chlorinated lime as a source of chlorine has the additional complication that the chlorine content of chlorinated lime may be very variable. Because such small amounts of the hypochlorite solution can be made to accomplish the desired amount of sterilization in the dairy it is more practical to purchase the higher quality of the commercial stabilized hypochlorite solutions.

Procedure

For the cleaning and chemical sterilization of milking machines, the following procedure has given excellent results at a minimum of labor and expense.

1. Immediately following milking, the machine should be rinsed free from milk. This can be done easily by dropping the teat cups into a pail of clean water while the power is still on.

2. The next step is to remove the milk fat which adheres to the rubber parts and causes their rapid deterioration. In milking machines that do not have aluminum parts, this can be done easily by drawing a dilute solution of high-test lye through the machine. The lye converts the fat into a soap which is readily removed by the solution.

The proper solution is most easily made by dissolving one can of high-test lye in one gallon of water. Occasionally, poor results have followed the use of low grade lye for this purpose. An iron or granite kettle is suitable for this purpose, but aluminum should never be used. When dissolved, this lye stock solution should be transferred to a gallon bottle and kept tightly stoppered, as it will gradually lose its strength if exposed to the air. To avoid accidents it is well to remove the label from the can of lye and paste on this bottle.

A small glass of this lye stock solution added to a gallon of water makes the proper solution to remove the fat from the machine.

A small glassful (about 6 ounces) of this lye stock solution added to a gallon of water makes the proper solution to remove the fat from the machine.

The lye solution should not be used on machines which contain aluminum parts. They should be scrubbed free from fat by brushing with washing powder and hot water.

The machine is now ready for chemical sterilization by the chlorine solution. Until recently it had been the practice to place the entire unit in a crock of dilute sodium hypochlorite solution and subject the exterior as well as the interior of the machine to action of the hypochlorite. This procedure has several very obvious defects. A substantial amount of solution is necessary to fill a crock of sufficient size to contain the unit. In an effort to economize, the solution was used for indefinitely long periods, frequently long after the available chlorine had been dissipated by organic material. The cost of maintaining an effective chlorine soak jar was a small but definite item. In addition, the same solution was in contact with both the outer and the inner portions of the unit, and the outer portions were not always in the best sanitary condition.

It was recognized that a rack that would maintain a solution of hypochlorite in contact only with the inner portion of the unit, and would require but a small amount of hypochlorite solution, which would be used but once, would be ideal. Several such racks were devised and offered by commercial firms. Most of them had a supply reservoir and one or more stop cocks. While perfectly

satisfactory, they cost between five and ten dollars, which is more than the average dairyman can be persuaded to invest in such equipment. A perfectly satisfactory substitute has been made from 2 x 4 inch wooden pieces, two 11 inches long and one 12 inches long, with three 14 inch pieces of lath or lattice. The total cost when all the material is purchased is 8 cents. The arrangement is shown in the illustration.

A perfectly satisfactory rack can be made for less than ten cents.

3. The third step is to place the unit in the rack and fill the unit with a dilute hypochlorite solution. It is left full of the hypochlorite solution until next milking when the tube is removed from the slot and the solution allowed to drain. The machine is now ready for use. Preliminary rinsing is not necessary.

Milk pails, cans and separators should be washed clean, with a good washing powder to remove the fat, as well as any organic material that might adhere to them. They should then be rinsed with clean water to remove any traces of the wash water. They should next be placed where they will dry. Cans and pails should be inverted where a free circulation of air may gain access to the pail. Some recent work indicates that it is not advisable to place the cans and pails where the sun can shine directly in the inside of the pail, as the action of the ultraviolet light from the sun on the minute particles of fat which may remain in the pail may induce a chemical reaction with the metals, resulting in metallic flavors.

Just before use, these cans, pails and separator parts should be rinsed with a hypochlorite solution to destroy any bacteria that might be present. Most of the manufacturers now recommend the use of sufficient hypochlorite to give 200 parts of available chlorine per million. Experience has shown that this high concentration is not necessary if the milk utensils are reasonably clean and the hypochlorite solution does not contain an undue amount of alkali. In fact, half the recommended amount may be used under ordinary conditions.

RABIES THREATENS

Next to tuberculosis, rabies is the most important health problem common to veterinarians and public health workers in Illinois. This disease has resulted in a tremendous destruction of domestic stock and no little loss of human life in Illinois during the last decade. Our laboratory records show that rabies infection was found in more than 3,000 animal heads examined in that period. Most of these were the heads of dogs which had bitten at least one person, frequently more. This is first-hand evidence that at least 3,000 people were bitten by rabid dogs in Illinois in the last decade.

The anxiety and cost associated with efforts at saving these people from a disease that ends invariably in death can only be surmised. Making laboratory tests of 7,000 heads is no small item. The State Department of Public Health furnished the Pasteur treatment to about 2,000 people who were not able to pay for this necessary service. Even under these circumstances, 45 people died from rabies in Illinois during the last 10 years.—Andy Hall, M.D., Director Illinois Health Department.

The Inter-Relation of Strains of Brucella*

By THEOBALD SMITH, Princeton, New Jersey

MUCH has been written in the past ten years on infectious abortion in cattle, the occurrence of related bacteria in other animal species and the effect of the agents of these diseases on the human subject. You have come together to discuss the best methods for combating abortion disease in cattle. Some of you are in the field in actual contact with the disease, others are working in the laboratory. Have we learned enough to suppress the bovine disease successfully and economically, or do we need more light? It has been my experience, and it goes back farther than yours, that when enough pressure has been brought to bear on a disease to force legislation for its suppression, the knowledge is usually insufficient and the attempts more or less abortive. Even today everything that can add to our understanding of infectious abortion is needed from whatever source it may come.

1. We need more knowledge of the abortion disease itself. In a recent study of 39 cases of abortion, I found 17 associated with B. abortus, five with vibrios, two with both B. abortus and vibrios, and 15 with these bacteria absent. What were the 15 abortions due to? Unless we know more about these negative cases, we are working more or less in the dark.

2. The abortion disease itself is not stationary. In fact, no infectious disease which is active remains the same. Changes undergone by the infectious agent and by the bovine race as years go by may make current tests more or less misleading.

3. What relation do the Brucella races from other species bear to the bovine disease? The researches of the past 45 years have brought to light a disease of thoroughly. The occurrence of Brucella in pus from fistulous withers and poll-evil makes contact with such discharges especially favorable to infection if this type or race is capable of producing disease in man.

5. Thorough knowledge of the various races of Brucella will enable the future pathologist to learn whether such a disease as bovine infectious abortion may be reintroduced from other species after it has been presumably exterminated in the bovine species.

goats, of swine, of sheep, or horses, and of man due to bacilli not distinguishable from the bovine disease by serological methods, although serological tests have been thus far the mainstay of the laboratory in distinguishing bacteria culturally identical. Fortunately, there are other tests that enable us to state more or less definitely that the Brucella types of these different diseases can be distinguished. These tests are: the pathogenic effect on small animals, particularly guinea pigs, the CO_2 test, the H_2S, and the dye or bacteriostatic test. With the aid of these various tests, none of which can be spared, we can distinguish the swine type and the goat type from the bovine type. The outstanding fact of the past ten years of investigation is the susceptibility of man to one or another of these Brucella races. It is this fact which seems to force eradication; otherwise the bovine disease would probably subside of its own accord as the bovine race becomes more resistant.

4. It is the fact that undulant fever occurs in man that has greatly stimulated the study of Brucella races. The studies

*Presented at the Third Annual Eastern States Conference on Bang's Disease, Trenton, New Jersey, November 9, 1931.

of strains isolated from man in this country have put the swine type as the chief cause of undulant fever in man. There is also evidence that this type may occur in the cow's udder. The bovine type is of minor significance in the human disease. In Europe and South Africa, however, there seem to be bovine races invading the human subject. It is probable that geographic races exist which may be ascribed to the widely differing methods of feeding livestock. Before, therefore, ascribing any one case of human undulant fever to cattle, the organism causing the fever must be isolated, cultured and tested to prove the assumption. The horse strain should also be studied more

FINDINGS NEED CONFIRMATION

In an epizoological study of shipping fever by the Kansas Experiment Station, losses among vaccinated cattle involved were found to be higher than among those not vaccinated. The disease was more severe in cold, wet weather, and the increase of loss during bad weather was greater among the vaccinated than with untreated animals. The weight of the animals and losses from shipping fever were not correlated. Heavy animals seemed to be as susceptible as 200-lb. calves. Losses were heavier in all weights of vaccinated animals than in the unvaccinated animals. Vaccination of animals at the farm after shipment was followed by a slightly greater loss than when vaccination was practiced at the yards. Vaccination of cattle at the farm after they had been vaccinated at the yards resulted in very heavy losses (10 and 11 per cent). Treatment of a small number of cattle with antihemmorhagic septicemia serum resulted in a reduction of losses to a very small figure.

Lesbouyries describes a paralytic colibacillary mammitis in cows, which is characterized by the onset of paralysis in the hind quarters, also in the rectum and bladder, in addition to inappetence, great depression and the usual symptoms of mastitis, except that the temperature remains normal. The disease usually ends in death of the animal in about three days. Copious bleeding is the only treatment that has shown beneficial results. Thirty per cent of the infected animals recover following copious bleeding. Bacteriological research in four cases revealed B. coli in the milk in pure culture.

MILK CONTAMINATION

As a rule milk contains very few bacteria as it is drawn from the udder. Most of the bacteria in milk come from outside sources. It is known that the largest number is added to the milk from the utensils, such as pails, cans, strainers and milking machines. Contamination from these sources may be reduced to a minimum by first rinsing the utensils with clean, cool or luke warm water and then washing them with warm water containing an alkaline washing powder, using a brush to remove all traces of milk and grease. Avoid washrags and soap. Soap in hard water forms a scum, a sticky, insoluble compound which adheres to the surface of utensils and is difficult to remove. After washing, they should be sterilized. When water is used as a sterilizing medium it should be at or near boiling temperature. When steam is used it should be under pressure, making sure that the utensils are heated until they are too hot to be handled with bare hands.

Many different kinds of bacteria may get into milk from the coat of the cow. The most undesirable ones come from manure, hay and dust. Those from hay decompose protein, often with the production of offensive odors. According to Roseneau their presence in excessive numbers may cause gastro-intestinal disturbance in children. It is obvious that all cows should be clean at milking time.

Usually flies are found in season wherever milk is exposed. They may carry infectious material to the stable or milk house. During the summer months the danger of contamination by flies is constant. Consequently, all milk and milking utensils should be protected against flies.

Albany, N. Y. John L. Miller.

Internal Parasites of the Dog*

THE veterinarian's business is to apply his general knowledge to a special case. He can't do it by proxy. The real art of medicine is diagnosis. Laboratory diagnosis of parasites is one of the soundest of laboratory processes, but there are contra-indications to the use of every anthelmintic. What about that? Suppose a sample of feces is sent in to the laboratory and an accurate diagnosis made. The laboratory technician is not justified in prescribing a treatment or supplying a remedy because he has no information about the special conditions, the contra-indications. I would not trust my client to give any anthelmintic. There are too many holes in anthelmintic treatment.

The veterinary profession is lucky in that its members are still clinicians and that their patients can't ask them fool questions, or supply them with misinformation as do the patients of human physicians. We have to "deliver the goods" on a basis of economic results and that keeps us on our toes.

Seurat introduced a useful classification for parasites with respect to their life history. He proposed these classes: (1) Monoxenous, parasites having no intermediate host, that is to say, with a direct life history; and (2) heteroxenous, parasites, such as tapeworms and flukes, that have an intermediate host. Subsequently Skrjabin has suggested that monoxenous parasites may be said to produce a geohelminthiasis, and heteroxenous parasites a biohelminthiasis.

These names, of course, indicate the source of the parasite eggs or larvae that infest the animals. Geohelminthiasis is so named because the infestation is obtained from the earth or soil, and biohelminthiasis because infestation by this class of parasites comes from living organisms.

These are exceedingly convenient terms. They are useful because they indicate two different set-ups in prophylaxis. Prophylaxis for geohelminthiasis means keeping the manure away from the host animal. The prevention of biohelminthiasis means keeping away the intermediate host. Or, to put it another way, hookworm infestation, ascarid infestation and other forms of geohelminthiasis simply mean that the host animal has been eating feces. Biohelminthiasis means that the host has been eating some infested grubs, flies, fleas, fish, mammals or other animals.

The important parasites of the dog include: (1) Ascarids; (2) hookworms; (3) whipworms; (4) tapeworms; (5) heartworms; and (6) tongueworms.

Ascarids

There are two species of ascarids that infest the dog, *Toxacara canis* (*Syn. Belascaris canis*) *and Toxascaris leonina* (*Syn. T. limbata*). *Toxacara* is commonest in puppies. It is the only one of these ascarids that is known to cause prenatal infection. *Toxascaris* commonly affects older dogs.

Toxacara canis occurs in very large numbers in puppies and may be fatal. I recall one of our own very young puppies that died of this infestation. At the time of death, the worms were crawling out of the nose and the mouth; they were in the esophagus and the pharynx. I counted over 2,000 in this puppy at the autopsy.

The egg of *Toxascaris* is smooth-shelled; the egg of *Toxcara* is stippled.

Ascarids in the dog commonly occur in the small intestine, but as with other parasites, when present in large numbers, they may become crowded and invade new locations. They may occur almost anywhere in heavy infestations; in the bile duct, in the stomach, lungs and nostrils.

The eggs of ascarids are voided by the infested animal. They are not infective when passed and the time required for development to the infective stage varies. Ordinarily in summer, it requires one to two weeks. Under unfavorable conditions, it may be much longer. After the infective eggs are ingested the larvae wander widely

*Notes from an address by Maurice C. Hall, Chief, Zoological Division B. A. I., Washington, D. C., at the Eighth Annual Post Graduate Short Course for Veterinarians, Michigan State College, East Lansing, January 26-30, 1931.

through the tissues of the animal. *Toxacara* wander about more than *Toxascaris,* and the larvae may be found encysted in various tissues. It is perfectly possible to feed the pregnant bitch infective eggs of the former species and find larvae in the puppies at birth, showing that in their wanderings through the tissues of the mother, they have invaded the uterus and the fetus.

This wandering is a possible and sometimes actual cause of reinfestation. For example, if an infested animal be given an anthelmintic that clears all of the ascarids out of the intestinal canal, the larvae that are at that time wandering about in the tissues of the animal may cause a reinfestation within two weeks, even though the animal is prevented from ingesting infective eggs after the anthelmintic is given. Many well-directed efforts at anthelmintic treatment and the prevention of reinfestation have gone astray for just this reason.

Further, if there are many ascarids in a dog, some of the females may invade the bile duct and thus anthelmintic treatment will not reach them. Eggs deposited by these females would be voided in the feces and might lead one to question the efficacy of the treatment used.

Symptoms: The symptoms of ascariasis in the dog are not well defined. This is true of parasitisms in general. Experiments to ascertain the clinical effects of parasitism should be carried out by taking a known healthy animal and infesting it with one species of parasite, using various numbers of worms in different individual hosts and noting the effects produced, and then repeating the experiment often enough to determine definitely just what each species of parasite does to the animal. In the same way we should ascertain what several species do in combination.

For gastro-intestinal parasites other than the blood suckers we have, in the main, only the term unthriftiness to describe the symptoms. The special symptoms will not be known until we have more clinical and experimental observation to go on. We have more information on the effects of ascariasis in man than we have in the dog. In man, ascarids are reported to cause abscesses. Ascarids are sometimes responsible for icterus, volvulus, coma, intestinal obstructions and other bizarre effects that make us hesitate about saying just what the extent of their injury to the animal may be.

Treatment.—For the elimination of ascarids, chenopodium is effective. It is not excelled by any other parasiticide. In my experience in the use of this anthelmintic which covers a period of 15 years, I have always found it safe. Not all have found it so, however. I think the differing results must be due to a difference in the way it is used. It is essential to get purgation after giving chenopodium. Safety lies in so doing. When we were using this agent in Nicaragua in treating people, we made it a rule to give a purgative (saline) at the time we gave chenopodium. If there was no bowel movement in four hours, another purgative was given, and if purgation was not obtained in another four hours, our program called for such measures as enemas, abdominal massage and other procedures to obtain purgation. We considered that an emergency was confronting us and that puggation must be established immediately by any possible means.

A large number of those to whom we gave anthelmintics of any sort whatever complained of headache, nausea or dizziness, or any two or all of these things. These symptoms disappeared as soon as purgation was established. Dogs probably suffer from the same conditions and are probably relieved as promptly by purgation.

As a purgative for use with chenopodium in dogs, I prefer castor oil to any other, but there isn't a bit of use to give castor oil except in adequate quantities. Give the ordinary small healthy dog, one ounce. Give a weak dog or a puppy or any dog about which you have any doubts, at least two ounces. Safety lies in the use of an adequate quantity of castor oil. In the failure to obtain purgation after the administration of chenopodium lies much of the danger which the anthelmintic possesses under ordinary conditions.

There are some contra-indications for the

use of chenopodium. In severe debilitating disease, such as distemper or cases of mange, it is obviously contra-indicated, but what are you going to do? Suppose an animal has distemper and is at the same time suffering from a severe hookworm infestation. If it is not freed from the hookworms, the distemper will kill it. It is merely a matter of balancing the conditions for and against and manipulating the treatment to give the animal the best opportunity to recover.

Stiles has suggested the giving of a very light dose of anthelmintic in such conditions and a little later, when the animal has improved, another. In many such cases if we wait until the dog is over the distemper to treat it for worms, we will have no dog to treat; and on the other hand, if we give it the usual anthelmintic treatment as a preliminary to undertaking the treatment of the distemper, the anthelmintic may remove the worms, the distemper and the dog all in one cargo.

We haven't enough reports to know what to do in these conditions. In the United States, veterinary practitioners are terribly negligent towards science. The average practitioner in this country acts as if he thought the science of veterinary medicine was established and required nothing further from him. It is far from true.

Tetrachlorethylene is an effective agent for the removal of ascarids from the dog. It doesn't cause necrosis of the liver as does carbon tetrachloride. It has been reported to cause blindness and yet in the large number of cases in which it has been used in the Zoological Division and in the work of most practitioners, no such result has followed its use. Doctor Wright thinks that the blindness may be due to tetrachlorethane. As a matter of routine in our experiments in the Zoological Division to determine the efficacy of anthelmintics, we subject our anthelmintics to an analysis to determine if they are pure. One sample of what was supposed to be tetrachlorethylene obtained in the usual way on the market was found to be tetrachlorethane, and I strongly suspect that cases of blindness in dogs following the use in the field of what was thought to be tetrachlorethylene was due to tetrachlorethane which had been sold under a tetrachlorethylene label.

Tetrachlorethylene does double duty. It removes the ascarids and it removes hookworms also.

Many prefer santonin as an intestinal anthelmintic for dogs. Much has been published recently concerning this drug that is not justified. A single dose of santonin rarely removed all the worms, even if given in enormous quantities, in critical tests in this country and elsewhere. It is nowhere near as effective in a single dose as is chenopodium. In Nicaragua, where we used it on man in a number of cases it caused just as many headaches, just as much nausea, and just as much dizziness as did chenopodium, and in addition, it sometimes caused green or yellow vision.

Hookworms

Three species of hookworms, *Ancylostoma caninum, Uncinaria stenocephala* and *Ancylostoma braziliense,* inhabit the small intestine of the dog. The eggs passed from an infested animal hatch and the larvae develop to the third stage larva, at which stage they are infective. The larvae gain entrance by being swallowed or they may enter through the skin. When swallowed the larvae apparently do not wander, but remain and develop in the intestine. When entering through the skin, the larvae wander through the tissues until they reach the intestine to develop further.

The symptoms produced by hookworm infestation are anemia, debility, emaciation, depression and edema. The swelling is at first intermittent, later permanent. There is sometimes a muco-purulent nasal discharge, often streaked with blood, and sometimes nasal hemorrhages. Some information on the subject indicates that anemia, which appears to be the basic symptom, may be due not only to blood-sucking by the parasite, but also to hemorrhage after the parasite releases its hold.

Tetrachlorethylene is the best anthelmintic we have for the hookworm and it is efficient. Of course, there are some failures in any treatment, but some of the criticisms of this agent have not been justified. I recall

one case where a veterinarian in the South told me that tetrachlorethylene had been a failure in his hands. I asked for particulars, and he said he had treated four dogs that were thin from hookworm, and that they remained thin. I asked him if they were actually infested with hookworms, and he said he supposed they were because they were thin. I asked if any hookworm eggs were found by microscopic examination, and he said he had not made a microscopic examination. Of course, the criticism of tetrachlorethylene or any other anthelmintic on that basis is unsound. No drug can be depended on to make thin dogs fat.

There will be an occasional failure from other causes. I recall a large hound that I was using in some work while I was located at Detroit. On the autopsy, we found this hound to have an enormous stomach with a wall as thin as parchment paper. The wall was completely atrophied and the stomach contained a large quantity, perhaps a gallon, of liquid. Now, even an effective drug poured into a stomach like that would probably be unable to act effectively.

Rare cases have been reported in which man has become infested with the common hookworm of the dog. One of the hookworms in the dog, however, *Ancylostoma braziliense* is pathogenic for both man and animals and is common in both. In man its larvae is the cause of a creeping eruption of the skin.

Whipworms

We know little about the harm that whipworms, *Trichuris vulpis,* do to dogs. However, in New York City many dogs have them and have no other parasites, yet they suffer from various symptoms, including unthriftiness, and are benefited by effective treatment or by removal of the cecum. It is just another illustration of how little we know about the pathology of parasitisms. We probably have a comprehensive knowledge of less than 1% of what we should know about the parasitisms of animals.

The treatment of dogs for the removal of whipworms is subject to the handicap that our anthelmintic may not go into the cecum where the worms live, or if it goes into the cecum, it may not reach the tip where the whipworms are thickest.

Theoretically, an anthelmintic for this parasite should be one which could be given in a large dose, hence it must be a non-irritant parasiticide, in the hope that some part of the large dose would reach the parasite; or non-irritant parasiticides which can be given in small doses over a long period in the hope that an occasional dose will get into the cecum and reach the worms.

Of this latter type, santonin is perhaps the best. In fact, that is the proper way to give santonin under any conditions. In our experience, two-and-one-half grains of santonin, given as a half-grain daily for five days, will remove more ascarids than five grains will at one dose.

We can't always determine the effect of our anthelmintics by fecal examination. That plan is full of holes. The real test is to count the parasites removed, kill the animal, and count the parasites that remain. In that way only can we know what we are talking about.

Leche de Ligueron, the latex of a certain species of fig, has proved an effective treatment for whipworms in man, and some tests have indicated that it is effective in dogs also. In tropical countries where the figs grow, there has been difficulty in obtaining the latex of the right species. A preparation that will keep has recently been offered on the market. There have been too few experiments to determine whether or not it is satisfactory for dogs.

Taeniasis

Species of two genera of tapeworms commonly infest the dog, species of *Taenia* and of *Dipylidium*. The latter is the commonest. In fact, species of *Taenia* have almost disappeared from city dogs. Their intermediate hosts are various herbivorous mammals. Dogs that have no opportunity to eat portions of infested carcasses of mammals do not acquire tapeworms belonging to this genus. The intermediate hosts of *Dipylidium* are various fleas and lice, and naturally this parasite is common in dogs almost everywhere.

Dipylidium infests man also, and over 75

cases of the sort have been reported. Man gets it, of course, just as the dog gets it, by swallowing fleas and lice. If he permits his dog to accompany him to the table, a flea may jump off the dog and fall into his breakfast food or his soup and be eaten and set up an infestation. There are ample reasons for keeping the dog free from tapeworms.

Treatment: A number of agents will remove tapeworms. Arecoline hydrobromide is probably the best for general use. Species of *Taenia* are readily removed, but unfortunately *Dipylidium* has the habit of sewing its head and the first few segments into the mucous membrane of the intestine and is hard to remove.

Heartworms

Formerly heartworms were found only in certain districts in the southern part of the country, but now we are finding them far more widely. Many hunters take their dogs south with them, get them infested, and bring them back and establish the infestation in new localities. And then the tin-can tourist must be reckoned with. He takes his dogs and his family and his household effects everywhere and there is no part of the country that may not be infested by dogs that have been south or elsewhere and become infested with this and other parasites.

The heartworm is transmitted from animal to animal by mosquitos which are widely disseminated. The principal symptom of a moderate infestation is that the dog tires easily. After hunting for a half-hour, he will return to his master panting and unable to continue the hunt. More severe infestations results in dyspnea, pronounced cough, and ascites. Such cases ordinarily die quickly but sometimes they suffer a slow and painful illness ending in death.

Lentz of Philadelphia has done a lot of work to find an anthelmintic for this condition. He has given just about everything in the pharmacopeia except the covers and the title page. He has given these remedies by mouth and intravenously. He has succeeded in killing the adult worms and he now is confronted with the task of ascertaining which of the many agents he tried killed the worms.

Prophylaxis consists in screened kennels and swinging doors that will close after the dog enters and in keeping the dog inside and protected from mosquitos from dusk till dawn. In Hawaii, where the trouble is common, they think that long-haired dogs suffer less than short-haired animals. Probably the long hair furnishes a certain amount of protection against mosquitos.

Tongueworms

These are not true helminths but a degenerate arachnid, a relative of spiders and ticks. The species infesting dogs and some other animals is *Linguatula serrata.* There is plenty of tongueworm infestation among the dogs in the United States. It is common in the South, especially in Georgia, although many southern practitioners do not know it.

The tongueworm of the dog is infective in its larval stages for man and cattle. These are perfectly good reasons why the family dog should be kept free from tongueworms.

Dogs infested with tongueworms may show no symptoms or may have sudden attacks of sneezing. There is often loud snoring and the animal may rub its nose with its paws. Tongueworm infestation has been thought by some to be the exciting cause in some attacks of "fright disease"; the evidence is all against this idea.

Pinworms

Dogs do not have pinworms. What are commonly called pinworms or rectal worms in this animal are segments of *Dipylidium* which move out of the rectum and on to the perineum under their own power.

Anthelmintic Treatment of Cats

Cats are highly susceptible to the poisonous effects of anthelmintics, and some tapeworms are highly pathogenic for cats. Where cats are kept to kill rats, there is often a history of sudden death among the cats. It is frequently due to the tapeworm for which the rat is the intermediate host.

Arecoline hydrobromide is perhaps the best anthelmintic for tapeworms in cats. The dose should be very small, one-eighth to one-sixteenth of a grain.

The American Groundsels Species of Senecio as Stock Poisoning Plants

By A. B. CLAWSON, Washington, D. C.
From the Pathological Division, Bureau of Animal Industry, United States Department of Agriculture

WITHIN the past few years the group of plants commonly known as "groundsel" or "ragwort," has become increasingly prominent in various parts of the world as a source of potential danger for domestic animals. In North America a member of this group first attracted attention in Nova Scotia, Canada, in connection with the Pictou cattle disease.

Between 1906, when Pethick[3] published the results of his feedings, in which he demonstrated that one of the groundsels, (*Senecio jacobaea*), was the cause of Pictou cattle disease, and 1929, when the "walking disease" of northwestern Nebraska was shown by Van Es and co-workers[6] to be due to the ingestion of *S. riddellii,* little was added to the general knowledge of the North American groundsels as poisonous plants. It is true that Pethick continued his work and made additions to former results. Probably the most important contribution during this time was his demonstration, as pointed out by Rutherford,[5] that sheep were much less liable, than other animals, to be poisoned by the *Senecios* and could be used in extermination of the weed. Pethick, without much doubt, was to a considerable extent influenced by an investigation being carried out by Gilruth[2] in New Zealand, in which he found that Winton disease, a condition affecting both cattle and horses and very similar to the Pictou disease, was caused by *S. jacobaea.*

The work of Gilruth in New Zealand and that of Pethick in Canada deserve prominence, because the workers called attention to a group of plants generally considered harmless, at least one of which was shown to be a source of danger. As a result of Pethick's investigations, too, the expensive practice of considering Pictou disease as contagious, and of slaughtering the animals to prevent its spread, was seen to be erroneous and was consequently stopped.

At about the time that special attention was being focused on the *S. jacobaea,* two other species of *Senecio* in South Africa were under suspicion and were being made the objects of an investigation. As a result, Molteno disease, or "stomach staggers," was shown to be caused by this group of plants.

Because of the very close similarity of the symptoms and lesions, it seems very probable that other unexplained conditions, both in this country and elsewhere, are due to this group of weeds.

Feedings with Senecio integerrimus

The poisonous plant investigators of the U. S. Bureau of Animal Industry became interested in the *Senecios* in 1915, when feeding experiments were first undertaken with *S. integerrimus,* a species found growing in the early summer in central Utah. (For the general appearance of *S. integerrimus,* see Fig. 1.) These experiments were carried out at the Salina Experiment Station of the Bureau of Animal Industry, near Salina, Utah, during such summers between 1915 and 1930 as plant material could be obtained in sufficient quantity. During this time nine cattle, two horses and nine sheep were used in the experimental work. As a result, two cattle and one horse died, while of the other animals, five cattle and one horse were visibly affected, some of them being very ill. None of the sheep were injured, although they received very large quantities of the weed, two of them eating approximately ten pounds of the green plant each day for 27 or 28 consecutive days.

The two cattle that died were fed for 30 consecutive days, during which time they ate the equivalent of 92.3% and 135% respectively, of their own weights of green

plant. Other animals ate larger quantities without fatal results. A horse that died, in 81 days consumed the equivalent of 156% of its own weight of green plant, while the other one ate a 76% dose in 79 days. This latter animal was just beginning to show evidence of being poisoned when he was shot and autopsied. From the condition of his liver and what is now known of the history of the illness caused by *Senecio,* it was evident he would have eventually died as a result of the feeding.

These results were obtained by feeding plant material collected in the neighborhood

Fig. 1. A small group of *Senecio integerrimus* plants in bloom

of the Salina Experiment Station in central Utah. In all of the feedings, the entire plant, at various stages of growth, was used.

Plant material which had been obtained near Harrison, Nebraska, through the courtesy of Dr. L. Van Es and co-workers, was fed to one yearling steer. This animal, in 106 days, ate the equivalent of 212% of its own weight of green plant. While no visible signs of illness were apparent, the animal was unthrifty for at least eight months following the feeding. The final outcome is not known.

In the course of their study of walking disease, Van Es and co-workers[6] in 1927 and 1928 fed *S. integerrimus* to several horses without their becoming definitely ill. The animals were fed for periods varying from 24 to 52 days, and assuming they were fed the green plant, the different animals ate from 3% to 26% of their own weights.

While none of the animals became definitely ill; when their livers were studied microscopically some of them were found to have been more or less injured. When the quantity of the plant material eaten and the length of time the experimental feedings were conducted are taken into consideration, there would appear to be no discrepancy, between the results obtained by Van Es, and those obtained at the Salina Station. It is very evident that *S. integerrimus* is poisonous to cattle and horses and that the effects produced are the same as those which are reported to be caused by other species of *Senecio.* As pointed out by Van Es;[6] *S. integerrimus* probably never causes any trouble on the range or in pastures. The plants are present in the pastures only during the time when good forage is fairly abundant. They mature and die down early in the season, before other feed becomes scarce. Unless they should be present in abundance in an area to be cut for hay, they would appear not to be a source of danger.

Feedings with Senecio longilobus

In 1929 a new *Senecio* problem came to the attention of the Bureau. In making a "loco" survey of a number of areas in the Southwest, *S. longilobus* (see Fig. 2), a species closely related to *S. riddellii,* was found to be growing in abundance in pastures where serious losses of cattle were said to have occurred. To determine the toxicity of the species and its effects on livestock, starting in 1929, feeding experiments with it were undertaken. During the past four summer seasons, thirteen cattle, eight horses and seventeen sheep have been used in these feedings. Of these, three cattle, four horses and three sheep died as a direct result of the feedings. One steer and four horses were killed for autopsy purposes. These ex-

perimental feedings make it apparent that *S. longilobus* is far more poisonous than *S. integerrimus,* sufficiently so, in fact, that it may, and probably does, cause losses of livestock at times.

With *S. longilobus,* one steer was fatally poisoned by a single feeding of 1% of its own weight of green leaves, a horse by a 2% feeding, and a sheep by 2.5%. The steer was fed young, freshly collected leaves. The horse and sheep were given young leaves that had been allowed to dry. The dosages, however, were computed on a green plant basis. When fed daily over a period, one steer died after consuming the equivalent of 32.2% of its own weight of green plat in 68 days. A horse died after eating 14.8% in 19 days, and a sheep after being given 20% in 20 days. These three animals had been fed a mixture of leaves, stems and flowers. The material was, therefore, more nearly mature than the leaves which had been used in the single feeding experiments.

The experimental feedings strongly indicate that the leaves of *S. longilobus* are far more toxic than the stems, and that the young leaves are more poisonous than those from the older growth. This would appear to be an interesting confirmation of the opinion expressed by Van Es[6] in speaking of the relationship between *S. riddellii* and walking disease. He says: "It is by no means improbable that the very young plants are especially involved in the *Senecio* intoxication."

This greater toxicity of young leaves was also recognized by De Kock, Du Toit and Steyn[1] in their experimental work with *S. retrorsus* and other South African species.

Feedings with Senecio spartioides

On some of the range areas of southern Utah, another species, *S spartioides,* in favorable years grows in great abundance. No cases of the poisoning of domestic animals under range conditions are known to have occurred. Nevertheless a few feeding experiments which were made at the Salina Station make it evident that the plant is poisonous. Further study will be necessary before more definite statements can be made. Apparently, however, the effects produced by *S. spartioides* are the same as those produced by other species of groundsel.

Symptoms of Senecio Poisoning

Van Es and co-workers[6] have described the effects, both symptomatic and pathological, of *S. riddellii* on horses. They have called attention to the icteric condition occurring in some cases, the tendency to be away from other animals, the depression, impaired sensibility, yawning, lack of appetite, inclination to chew at various things other than food, the tendency to run into and push against objects, weakness, uneasiness, and, in the later stages, the almost constant walking without any apparent sense of direction.

Fig. 2. *Senecio longilobus,* found growing in Utah

All the peculiarities mentioned by Van Es have appeared in the horses poisoned at the Salina Station, although they have varied somewhat in the different animals. In the Salina cases, a latent period varying from 12 to 20 days elapsed between the termination of the feeding with *Senecio* and the definite appearance of symptoms, and the illness lasted for from 3 to 10 days. The first indication of illness in most instances was a tendency of the affected animals to stay by themselves, depression and inappetence. In a few of the cases, the first evi-

dence of illness was a congestion and yellowish discoloration of the sclerae and the visible mucous membranes; or, to those sensitive to it, a peculiar sweetish, sickening odor which emanated from the skin and clung more or less tenaciously to the hands of those who handled the animals. This odor, in the Salina cases, generally appeared to be more pronounced about the head, neck and shoulders than other portions of the body. After its appearance, the illness invariably grew worse rapidly so that within two to five days marked depression, uneasiness, weakness, and in some cases evidences of abnormal discomfort were apparent. By this time, too, the animals all began to walk about in a restless manner. (Fig. 3, shows a horse at this stage). At first, corral corners and various objects were avoided but within a day or two the animals lost their usual alertness and became more or less

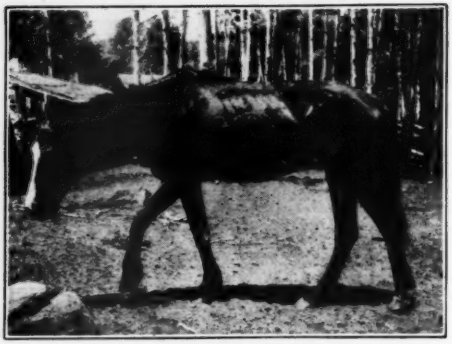


Fig. 3. A horse that had been poisoned by *Senecio longilobus*. The photograph was taken while the horse was walking about the corral in a characteristic manner; death occurred about 36 hours later

insensible to objects in their way. At this stage, the horses would run into corral fences, posts, or trees, and when getting into corners and even when walking directly into corral fences, would attempt to push ahead instead of turning. In such positions they became greatly confused and excited and if not gotten out within a very few minutes would work themselves into a profuse perspiration and would soon tremble and show other signs of weakness.

The icteric condition of the eyes varied from a slight yellowish to a dirty yellowish-brown discoloration. In some instances the urine showed little discoloration, in others it became the color of strong coffee or chocolate. All the horses, that showed definite symptoms, died.

In his description of the Pictou cattle disease, Pethick[4] divided the cases into two classes: those in which a condition of frenzy developed, and those which died quietly. He mentioned the rough coat, nervousness, shivering at times, lack of co-ordination, a peculiar odor from the milk and skin, the desire of the animals to be alone, a dropsical condition; and the usual appearance of symptoms after the animals had been on green pasture for a time.

A number of experimental cattle at the Salina Station were fed on *Senecio* for from 30 to 53 days, and then when apparently normal were turned into a pasture where there was an abundance of green feed. Disregarding the rough, unkempt appearance of the animals which was in part due to their having been kept on dry feed, these animals developed definite symptoms after being in the pasture from 12 to 21 days. During this period, some of them gained considerable in weight. Some of the animals died after several days of illness, others apparently improved. There is, however, considerable doubt as to their complete recovery.

The first indication of definite illness was usually their lack of appetite and a more or less depressed appearance. As with the horses, in some cases the first abnormality noticed in the cattle was the peculiar sweetish odor mentioned above. In other cases, probably because the animals had not been kept closely enough under observation, when the illness was first noticed, the visible mucous membranes showed a distinct yellowish discoloration which soon developed into a scabby condition. In some instances, areas of the skin irritated the animals. This was evidenced by the switching of the tail, the striking with the feet at various parts of the body and attempts to rub against the fences and trees. (Fig. 4, shows a steer pressing his nose against the fence as a result of this irritation.) This was especially noticeable in two of the cattle that had been

fed *S. integerrimus*. In such areas of the skin or external mucous membrane, a pronounced edematous condition developed, and in some instances, serum literally oozed out of the skin. The odor, mentioned above, seemed to be more or less associated with the subcutaneous edema. Some animals were constipated, others, at times, had a mild diarrhea. None of the experimental animals developed the stage of frenzy mentioned by Pethick and seen frequently by other workers.

With the sheep the only visible symptoms noted were depression, weakness, loss of appetite and a more or less jaudiced condition. The icteric condition was evidenced by the discoloration of the mucous membranes, and, in some cases, pronounced discoloration of the urine. In some instances, evidences of abdominal pain and spasmodic muscular twitching were noted.

Lesions Produced by Senecio

For a description of the lesions, both gross and microscopical, the reader is again referred to the admirable paper by Van Es and co-workers.[6] While, fundamentally, the Salina cases agree with the description given by Van Es, it seems worth while to call attention to a few outstanding features.

In both the autopsies and subsequent microscopical studies, the liver was found to be the organ bearing the brunt of the injury. Attention should be called to the condition of the gall bladder in the cattle and sheep. In some instances the organ was very greatly distended with bile, the bile itself being mucilaginous. The gall bladder of one 450-pound steer was over twelve inches long and contained three quarts of dark-colored, mucilaginous bile. (This gall bladder is shown in Fig. 5.) In other cases the walls of both the gall bladder and the bile ducts were much thickened by a coagulated, serous infiltration. In some cases there were evidences of irritation in various portions of the alimentary canal; while in one steer that had been fed for a prolonged period, the submucosa of the abomasum was heavily infiltrated with coagulated serum, giving the folds of the mucosa a thickened, jelly-like appearance. In this animal, too, the mesentery, especially of the cecum, was thickened by a serous infiltration.

The types of changes in the liver tissue were associated with the method of feeding and the duration of illness. In the acute cases, or those in which the illness preceding death was of short duration, very pronounced degenerative changes were found in the parenchyma. These had led to necrobiosis, necrosis, and severe hemorrhages into the lobular structures. When the illness was somewhat more prolonged, or a longer time had elapsed between the feeding of the plant and the death of the animal, attempts at repair had taken place. The hepatic cells were of all sorts of shapes and sizes and some infiltration with leucocytes had occurred. In these cases more or less proliferation of the connective tissue elements had taken place. In the prolonged cases, or those in which small daily doses of *Senecio* had been given, the greatly increased quantity of connective tissue was very much more conspicuous than the degenerative changes in the liver cells. This was especially prominent in two of the sheep. In the livers of these animals, the parenchyma of a large portion of each liver lobule had been replaced with connective tissue. Considering all of the cases on which autopsies were made, the condition of the livers varied from extreme degeneration to a vigorous formation of scar tissue with all degrees of variation and combinations between the two extremes.

Fig. 4. A steer pressing and rubbing his nose against the fence. Several other areas on his head and body were pruritic

Summary

The most important results of the experimental feedings of three American species of *Senecio* are given.

S. integerrimus is shown to be capable of poisoning horses and cattle, but it is pointed out that because of its habits of growth it is not a source of particular danger on the range or in pastures.

S. longilobus is shown to be one of the more poisonous of the American species of *Senecio* and a source of danger for grazing animals. Data are given regarding its toxicity for cattle, horses and sheep, and it is pointed out that the young leaves are more poisonous than the older leaves or the stems.

S. spartioides is added to the list of plants known to be poisonous.

Papers dealing with the symptoms and lesions produced by American species of *Senecio* are cited and the more prominent effects observed in the cases produced at the Salina Experiment Station are described briefly.

Fig. 5. The gall bladder from a small steer that had been poisoned by *Senecio longilobus*. The size of the gall bladder can be judged by comparison with a hand of the man holding it

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MANY TWIN CALVES

I have noted a rather interesting incident in connection with twin calves recently. A client of mine has had three cows calve within a month, all producing twins. These twins were all sired by the same bull and two of the cows are dam and daughter. The other cow is no blood relation to the bull or to the other two cows.

Williams* states that twins are usually produced after either a long period of sterility or very recent pregnancy, and is due to a disturbed state of reproduction, that the abortion rate in twins is much higher than in single calving and premature birth is general, and further, that twins are mostly males.

The conditions observed by Professor Williams no doubt generally obtain, but in this instance they do not apply since all six of these twin calves are heifers. In only one instance was there any dystocia and these I delivered with but little difficulty. There was no retained afterbirth and the cows and calves are all doing well.

I think in this instance, we must allow that heredity had a good deal to do with it. The tendency to twin both in the human and in uniparous animals has long been recognized as hereditary.

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Bainbridge, Ohio.

* Pathology of Reproduction; VETERINARY MEDICINE, Vol. XXVII, No. 7, July 1932, page 285.

The Veterinarian and Commercial Dog Foods

By JOHN W. PATTON, East Lansing, Michigan

THROUGHOUT this series of articles the writer has held to the policy of hewing to the line with facts and without favor; allowing the chips to fall where they may. Now that I am discussing members of my own profession, I see no cause to alter that policy. Much has been written about commercial dog foods from a nutritional angle. We have touched on the veterinarian and his obligations to client and patient. We have taken issue with those who have unjustly criticized the ability of veterinarians in general because of their experience with individuals. The writer feels that all of this should stand as written; he is not obligated to any individual or group of individuals in writing these articles. The reprints are available to all who are interested. I appreciate highly the hundreds of letters of encouragement that have been received and take this opportunity to acknowledge my indebtedness to the writers of those letters. This whole study of dog foods and their use has been made and these articles written that the members of the veterinary profession may have in their possession certain basic facts to guide them in matters of nutrition in the dog, which admittedly is an important problem in their practices. It is not possible to please everyone, so no effort has been made to please anyone. I can deal with conditions only as I find them upon conscientious investigation.

The subject matter for this article has been accumulating for several years. When these studies on commercial dog foods were initiated one of my earliest observations was the strained relationship between the average dog food manufacturer and certain veterinarians. I had observed in conversation with the average manufacturer of dog food that the veterinarian sooner or later came in for consideration. In fact, any such conversation was often tantamont to hearing a discourse on the activities of "some damn fool veterinary"—these are their words, not mine. I have heard tales of ignorance on nutritional matters; of interest in personal gain; in fact, tales of every conceivable sort of grievance a manufacturer could possibly have. I have received letters by the score from dog food manufacturers lamenting the activities of certain veterinarians who, in one way or another, had interfered with the sale of that manufacturer's type or brand of dog food. These caustic letters were accompanied in many instances by newspaper clippings, magazine articles or circulars written by some veterinarian. The complaints, basically, were the same. Here is a veterinarian, a professional man, one whose busines it is to know, going out of his way to disseminate misinformation which often interferes with the legitimate sale of his (the manufacturer's) product.

This is not news to any dog food manufacturer nor to the average veterinarian. The dog food manufacturer has become calloused and perhaps somewhat bitter towards at least certain practitioners. I would like to inject this question here: Does the veterinarian think that he has license to set himself up as a little tin god, defy basic nutritional information, dispense misinformation and unjustly condemn any man or his product because of his professional (?) standing, and make him like it? The question is preposterous; statements must rest upon fact, not upon the pretenses of the individual making them.

Two groups are not considered in this discussion, on the one hand the manu-

facturer of an inadequate, unworthy and misrepresented food (and preceding articles have shown there are such manufacturers aplenty) and the unworthy veterinarian, the quack (whether graduate or not) and the imposter whose interest in the use of dog food is solely a monetary one. The veterinary profession, like all other professions, trades and businesses, has its black sheep. It hasn't any larger percentage of undesirables than has other professions. Not much can be done about it. Apparently we must live with them. Certainly they do not speak for the profession they have disgraced or represent it. In this article I refer to the high-class, dependable manufacture of commercial dog food who has made an earnest effort to produce a good product and has the scientific evidence to prove that he is making such product, and the well meaning veterinarian whose chief interest is in rendering his clientele a good veterinary service. Such dog food manufacturers are an asset to the veterinary profession; they render a necessary service to it. Such veterinarians are an asset to the dog food manufacturer unless they are poorly informed on nutritional matters (as I regret to say some of them are); then they become a thorn in the flesh of the manufacturer and the irritation they produce is too apt to obscure the good qualities of the average run of the profession. Both are assets to the dog industry.

On the whole the veterinarians that give most cause for complaint are those who have followed the example of ancient China and built a wall around themselves; belong to few, if any, professional associations; attend few, if any, veterinary meetings; and read few or no professional journals. A sizeable proportion of them have spent many years in large animal practice and at a time in life when new ideas are slowly acquired, have been forced by changing conditions to take up small animal practice and have not changed their ideas of nutrition to fit their new patients. They have done much to lessen the regard of the dog owner for the advice of the veterinarian on matters nutritional. A veterinary degree, like any other scholastic degree, or the title of Doctor is not an end in itself. A veterinarian, like any other professional man, must keep himself informed, not alone on specific matters pertaining to his profession, but also on pertinent matters of collateral information.

The strained relationship between the dog food manufacturer and certain veterinarians was not only my earliest but also my most persistent experience. In fact, I grew so utterly weary of having some dog food manufacturer who knew little about nutrition and often cared less, belittle the entire veterinary profession because of the activities of certain veterinarians that I decided to pursue the investigation to a conclusion. I found that high class manufacturers do have just cause for complaint.

There can be no denying the fact that certain veterinarians have abused their professional standing in giving unsupported personal opinion as canine nutritional information. I have personally investigated many, perhaps 50, specific cases in which some food manufacturer has made complaint regarding the activities of some veterinarian. My contacts have provided many times this number of opportunities to satisfy myself as to some of the existing conditions. I have intimated in other articles that the conscientious dog food manufacturer and the scientific veterinarian could do much to clear up the deplorable mess which confronts us in connection with commercial dog foods. I have repeatedly held that there was just cause for complaint regarding the quality and adequacy of many of the brands of food now offered for sale, and just as certainly it can be said that many veterinarians have failed in their obligation to their clients to give them dependable advice in the selection of food for their pets.

In preceding articles it has been pointed out that at the present time in commercial dog foods, fresh flesh has to compete with tankage; surreptitious

manipulations of inspection competes with Federal regulations; antique and unsalable articles of food manufactured for human consumption being relabeled compete with cans of dog food made with prescriptionlike precision specifically for the nutrition of dogs. These and many more undesirable conditions of greater or less importance are made possible of continuance by the lack of appreciation of quality and adequacy on the part of some veterinarians and their lack of discriminations; for I maintain that no unworthy, misrepresented, inadequate dog food can long continue on the market with the united disapproval of the veterinary profession. The competition in the dog food market is already keen, the added handicap of the disapproval by veterinarians, influencing as it does, in greater or less measure the selections made by hundreds of thousands of dog owners whom these veterinarians serve, would be too much for it to survive.

Other ways in which veterinarians contribute to the continuation of existing conditions, either thinkingly or unthinkingly, is by giving personal opinions as scientific facts; by acquiescing in superstitions as the line of least resistance; by contradicting one another on basic scientific nutritional information on which the facts have been worked out and there is no occasion for argument; by failing to use due diligence at all times in arriving at their diagnostic conclusions; by failng to demand scientific data from the manufacturer of any and all foods offered them for their consideration (all reliable and conscientious dog food manufacturers have, or should have, such data, and the veterinarian is entitled to see it); and by lambasting commercial dog foods without discrimination. Following a study of the entire matter from the point of view both of the manufacturer and the veterinarian, it appears to me that we must first recognize our own shortcomings, which are undeniable, as will be shown later, if we are to build up our prestige on matters nutritional, fulfill our obligations to patients and clients and enjoy a more wholesome relation with the high-class commercial dog food manufacturers.

I cannot agree with food manufacturers who maintain that these shortcomings are general or that the pernicious activities of certain veterinarians reflect the reaction of the average of the veterinary profession. In this, as in most instances, the claims of a vociferous minority are apt to be mistaken for the views of the more or less silent majority. Not a few of the manufacturers have adopted this mistaken view to their own and the profession's disadvantage. Nevertheless, I admire their tolerance, under sometimes great provocation, and their desire to be helpful. I appreciate their assistance in my efforts to bring this matter out into the light and to correct it.

What are some of the specific abuses which draw the fire of the average dog food manufacturer? Let us approach it in the following manner. What would the veterinarian think if his wife consulted the family physician and the case developed somewhat as follows: In the course of his examination the physician brings out the fact that his patient had been eating, let us say, Bambell's Soup. The physician immediately sees in the use of this particular brand of soup the cause of the patient's condition (I said let us assume the physician does this—he doesn't) and tells her she should use only Pinze's Soup and she will have no further trouble and will continue to pay life insurance for many years to come. He collects two or three dollars for this advice. What would said D. V. M. think when he himself and his friends, as he well knows, enjoy perfect health on Bambell's product? What do you suppose the local grocer, the wholesale grocer and even Mr. Bambell would do and think? What do you suppose they would do and think if this happened repeatedly with the same individual or with the individuals which represent any body or profession? You have guessed it—they would ignore that individual or those individ-

uals' advice and perhaps belittle the nutritional advice of all physicians.

Let us take another instance: The veterinarian goes to his physician with a skin disturbance. In the course of the examination the information is brought out that the D. V. M. is a great eater of any particular flesh. The physician, too indolent to make a genuine examination, blames the eating of this particular flesh for the skin disturbance, and without qualification assures the veterinarian that if he will change to frog meat the skin rash will disappear. The advice is followed—but the condition gets no better. The veterinarian next consults another physician, who after a painstaking examination suspects the skin disturbance to be an allergy and finds out that it is a new feather pillow or perhaps a new lacquered screen that is the cause of this skin disorder. He will have little confidence in the advice of the physician first consulted. He will think that he does not know his feathers, his lacquers or his eczemas; in fact, that he is a poor diagnostician.

Do these veterinarians who are promulgating careless or unseasoned or spurious advice on the nutritional requirements of his patients think that because their advice is asked for and they are paid for giving it, that their clients do not weigh and consider its soundness and watch the results of following it? I can assure them that their clients do do these things and I can show by hundreds of specific instances that it does not pay to give other than well-considered sound advice in the matter of feeding dogs. The owner of any dog can get plenty of other kinds of advice without paying for it. So much for that. If you think these conditions are a brain child of mine or if you think that these conditions happen only now and then, and that the veterinarian who is so indifferent to his professional obligations is so rare as to be not worth bothering about, investigate the matter as I have done and learn of your error. We must remember that small animal practice has developed very rapidly during the past ten years (an evidence in itself of the fine service rendered by the average veterinarian) and that many veterinarians have **gone** into, rather than **grown** into it. It has not reached an equilibrium. The wheat has not yet been sorted from the chaff; but improvement is apparent.

I will cite two specific cases I have looked into recently as examples of many that might be cited.

No. 1. A Bull Terrier is brought to Dr. A. for examination, diagnosis and treatment. The dog has shown some evidence of indigestion and, according to the history, a condition bordering on a fit. The scene is now in the office of Dr. A. The Doctor speaking. . . . "What have you been feeding the dog?" Client: "Kibble biscuit, kibble biscuit and milk and table scraps." Doctor: "Have you had the dog wormed?" Client: "Yes, about six months ago." Doctor: "Well, it is the ——— kibble you are feeding that is causing the trouble. It always causes this condition. Stop feeding it, if you don't want to kill your dog. Use only ——— brand of dog biscuit and give him milk and some table scraps. Leave the dog here and come for him tomorrow." This the client does. She also takes the remaining ——— food back to the dealer, tells her story and changes to ——— brand. The doctor is paid and she ignores what the dealer has to say about ——— kibble being scientifically one of the best brands of dog food on the market. The dealer knows that it has been developed after the most painstaking research, that hundreds of his customers feed it regularly and that it does not cause any of the conditions in their dogs that she has charged it with producing. He understands, however, this is just another one of those cases which he has long since stopped worrying about.

The owner of the dog is satisfied up to this stage. Isn't the dog going to be well now? Didn't a veterinarian do and say so and so? The dog has no more fits. The story of his sickness and his

recovery is told and retold to the neighbors and friends. The husband of a neighbor woman is not so sure, however. He has for years fed this food that is said to always cause fits to two dogs of his own and knows any number of people who feed it and swear by it. Anyhow, the dog looks wormy to him and he urges the use of ——— worm medicine. It is tried. Luck is with them and they get some worms. Luck continues with them and the dog doesn't die nor appear injured by the worm poison.

Then the picture changes, but the veterinarian doesn't hear of it. But for my investigation (I happened on the scene about this time) he would probably never have heard of it and as to the loss of his client would have concluded, "Well, you can't please them all." I can tell this veterinarian that he now has at least seven families that are skeptical as to his ability and have little confidence in him. They are not sold on his veterinary advice and they make no bones about telling it to all comers. And it all started because of a radical dogmatic statement about dog food. A statement not founded on fact and flatly contradicted by not common experience and everyday observation but by careful scientific research as well. As for the merits of the case, I am in no position to judge. This much I know. The food he charged with causing the condition is one of the best on the market; the one he advocated using is perhaps the poorest. The manufacturer of the food he condemned has plenty of the most critical data to prove its worth. I gathered the information only and express no opinion as to the merits of the case. This much may be said, however. Outstanding small animal practitioners at our veterinary meetings and in our veterinary magazines are constantly stressing the prime necessity of a careful examination of every patient, not only as an obligation to the patient and the client who pays for it, but as good business for the veterinarian and a necessary precaution for his protection in eventualities that may develop. If such examination had been made in this case the veterinarian would, of course, have discovered that the dog had worms and would have eliminated them, or, if he thought they were not numerous enough to harm the dog, he would have so told the owner and thus protected himself from unfavorable criticism because they were found later by the owner and, possibly erroneously, charged with being responsible for the dog's illness.

No. 2. A police puppy is brought to Dr. B. for examination.

The puppy was fed once a day by its former owner. It was suggested that the puppy be fed ——— ——— canned dog food and ——— biscuit, as this is what it had been eating for some months. Nothing was said about the amount to be fed. The new owner disregarded the once a day advice and fed it several times a day. Its actions worried the new owner, and it was taken to the office of Dr. B. "The dog has influenza," said Dr. B. That satisfied the client, for there was a lot of influenza about town. Dr. B. was told what was being fed. He condemned it severely, saying: "——— ——— is ——— flesh and not fit to be fed to any living thing." The dog was given sedatives and ——— canned food recommended. A can of each food was opened. The nice white and red appearance of the doctor's favorite was contrasted with the dark "terribly unfit brand" which the owner had been using and was discussed and stressed. The dog improved for several days, then exhibited further attacks of "influenza." A second veterinarian was consulted. This doctor did not commit himself, as to diagnosis. He did, however, state that the brand of dog food now being used would cause "a brass monkey to throw fits." The owner was pretty well discouraged by this time and very much confused. The former owner assures me that when the matter was called to his attention he interviewed the new owner and it is his belief that neither food was to blame but the method of feeding. I know nothing about the merits of the case. The owner cannot

see why the two practitioners should be so far apart in their ideas and information on canine nutrition. She suspects both are wrong. She can understand a failure to agree on the diagnosis as being due to a difference of opinion. She thinks a food either is or is not fit to eat and will or will not give a brass monkey fits and two men experienced in the use of both foods should agree on them. At any rate the dog made remarkable improvement when the former owner straightened the new owner out on his ideas and she quit stuffing the dog whenever she could get him to eat. He sold her on method more than on any particular food.

I can tell these two veterinarians that the nice white and red appearance of the one food was perfectly possible. Its chief ingredients are rice from breweries and lungs from any source, bung guts, udders or what have you at the moment. It is one of the most worthless, filthiest and, generally speaking, the lowest type of food on the market. It is not so difficult to give a red, corned-beef appearance to meat of any kind with nitrites. That's just a little trick of the unscrupulous trade. The first dark brand is, in my estimation, of high quality and adequacy. Its manufacturers have engaged the services of some of the best nutritional experts in this or any other country, and have made intelligent use of the information so obtained.

I could go on indefinitely citing such cases, but these two illustrate my point. I want to make my position clear. I investigated these cases only to get all the data from all persons concerned. I make no claim or pretense that any of the veterinarians was doing anything but his professional duty. I care nothing about his diagnosis or his treatment. I am interested only in the food, his relationship, the client and his reactions, as well as what the manufacturers are constantly finding fault with—the activities of some "damn fool veterinary" as they express it. I hope some day to make them take it all back, but before that can be done some of the weaker members of the profession in matters nutritional must be brought up to somewhere near the standard of the average. This is quite some task, but it can be accomplished by education, by pressure from our professional associations, and perhaps in other ways. One of the early things to establish in the minds of all is that certain matters in nutrition have been definitely established by scientific investigation and are no longer matters of opinion, and further that personal opinion, whim or prejudice, even on matters that are not definitely established, had best be given conservatively, if at all, and not as if endowed with the finality of immutable law. In other words, when we are on uncertain ground we must not "take in too much territory." It doesn't go down with the public and the manufacturer might if provoked beyond endurance require us to prove our statements or accept a very embarrassing alternative.

Writing this article has been postponed long beyond the time when the facts upon which it is based were in hand. I have written it with reluctance. In some respects it parades our weaknesses in public. But I have spared not the manufacturer when facts justifying his criticism were in my possession. I must not gloss over the facts when the blame rests on our own shoulders. I don't want to see some veterinarian brought into court for slander in his home town, as has been threatened in my hearing times without number. I know the difficulty some statements I have heard are going to cause if that is done. I know that the good, solid structure builded by the profession as a whole is being injured by the thoughtlessness, indifference, indolence, incompetence, cupidity or whatever it may be of a small but nevertheless, on the whole, a considerable minority. I want to see that corrected, as it can be. With his background of knowledge of physiology and pathology, his broad experience and superior opportunities for observation, any veterinarian who is competent to conduct a practice is able to

qualify to give expert advice in matters of nutrition concerning any animal with which he is familiar, not in the sense that E. V. McCollum or E. B. Hart or H. Steenbock, to name only three of many, are experts; but in the sense that he can handle the case in hand intelligently and apply in a practical way the known facts that have been painstakingly developed by scientific investigation. There is no one else to do this for the dog, but if we neglect it further it will not be long before others less competent will willingly sacrifice themselves in this field—for a price.

The rank and file of the profession is right at heart in this matter. They have done well, considering the opportunities afforded them. It is essential that the minority who fail to measure up to requirements be brought into line by being educated out of their superstitions, persuaded to inform themselves in nutritional matters and by pressure being exerted to the end that they adopt higher ideals of service to their patients and their clients.

PROPER DIET FOR ANY BREED DOG

ALL DOGS ARE CARNIVOROUS(FLESH EATING) ANIMALS. DOGS DO NOT DIGEST STARCHY OR VEGETABLE FOODS. AS SOON AS WEANED, THEY SHOULD BE FED RAW MEATS, BEEF PREFERABLY, MILK AND EGGS SOFT BOILED OR RAW MAY ALSO BE ALLOWED. - ½ TO ¾ OF AN OUNCE OF MEAT PER POUND OF DOG SHOULD BE FED DAILY. FEED ADULT DOGS TWICE DAILY, PUPPIES OFTENER.

The above is a reproduction of the printing on the back of a well-known veterinarian's professional card. This veterinarian has practiced more than forty years. Note the errors. The implication is that dogs are exclusively flesh-eating animals which of course, is absurd. To state that they do not digest starchy or vegetable foods is to absolutely disregard the findings of authentic research and the common observations and experiences of everyone. There is no scientific data or practical experience upon which preference for raw meat over cooked meat can be established. The same applies to the preference for beef over other flesh and fish and even grasshoppers and crickets. Naturally, dog food manufacturers object to the dissemination of such misinformation. So do veterinarians. If followed it would make the cost of feeding dogs so high that their numbers would be greatly lessened—a result as objectionable to veterinarians as it is to dog food manufacturers, and opposed to the best interests of dog owners.

MILK INSPECTION

To be safe, milk must be sufficiently free from those contaminating bacteria sometimes loosely referred to as "dirt" bacteria so that, when fed to babies, it will not cause diarrheal and other digestive disorders to which babies are particularly susceptible; and the germs of those diseases which may be transmitted through milk from diseased cows or human "milk handlers" must either be kept out of the milk entirely or destroyed if they get in. As cleanly methods of handling and efficient methods of cooling milk have become more general, with the gradual decline in "dirt" bacteria content there has been a progressive decline in the death rate from diarrheal diseases in infants. Better milk has been the principal if not the only factor in this saving of infant lives. Generally speaking, there is no doubt but that we have a cleaner milk supply today than was available even a few years ago and the improvement over that of twenty years ago is most striking.

On the other hand, our records of milk-borne outbreaks of communicable and other diseases traceable to diseased cows and milk handlers indicate that we have made much less progress in preventing the transmission of infection from these sources. These records indicate that, notwithstanding the defects in apparatus and methods which have existed generally in the past, pasteurized milk has been in this respect relatively much safer than the "general run" of raw milk. With improvements in apparatus and methods of operation the factor of safety is constantly increasing. The most difficult undertaking ahead of us is to make raw milk sufficiently safe to warrant its continued use.

There are certain measures, some of which are applied on farms producing certified milk, which, if they could be generally applied, would make raw milk much safer than at present.—P. B. Brooks, M.D., Deputy Commissioner, New York State Department of Health.

Reviews and Abstracts

By FRITZ VOLKMAR, Columbus, Ohio

The Wanderings of Strongylids*

The eggs of *Strongylus bidentatus,* voided in the feces of horses, mature within two days. Within a week the young larvae moult and form a cyst within which they will resist external influences for many months.

If they enter the intestines of horses, the cyst is dissolved and the larvae enter the wall of the cecum or colon. They show a special tendency to perforate bloodvessels. Thus the majority of larvae find their way to the portal vein, the right heart and the lungs by means of the portal circulation. From the lung-capillaries the larvae penetrate to the alveoles and the air-passages. When they reach the oral cavity, they are again swallowed with the food.

Larvae which miss the intestinal tract migrate upward between the mesenteric layers and reach the branches of the arteria ileo-ceco-colica and the vena porta. Those penetrating the arteria portalis eventually reach the pharynx and the intestinal tract of the host.

The larvae, entering the intestines for the second time, pass through another moult and become sexually mature. Part of the larvae will enter the lymph system in this second migration through which they reach the vena cava.

The larvae gone astray upon the arterial walls of the mesenteric plexus progress slowly. They moult either in this medium or in the thrombus which forms around the larval body during its progress toward the lumen of the vessel. For this reason the worms are not immediately carried along with the bloodstream, and their incarceration in thrombi is thus facilitated.

During the process of thickening of the arterial wall, elastin is lost, causing lowering in the resistance of the wall toward the blood pressure, and the aneurysma forms. The strongylids arrived there after penetrating the adventitia, media and intima, are about 2 to 10mm. long. Following moulting in the arterial wall or in the thrombus, the six lips of the rosette-like head disappear and the worms grow to a length of 20mm.

Some of the larvae perish in the thrombus of the aneurysm or calcify in the arterioles of the intestines. In sporadic cases nearly mature specimens may be found either dead or living in the submucosa of the cecum or colon. It is not impossible that some specimens may reach the lumen of the intestine after they have been in thrombi, and take part in reproduction?

A small percentage of the larvae which have reached the anterior mesenteric plexus continues to migrate subserously and may reach the liver, kidneys, uterus, testicles.

The entozoic nodules, especially those of the connective tissue of the anterior mesenteric plexus, of the lung and of the liver, contain larvae of strongylids which have perished during their migration. A certain group of the nodules in the liver is caused by dead juvenile stages of *Cysticercus echinococcus.*

Larvae of *Sclerostomum bidentatum* cause the most severe lesions upon the nerves of the plexus mesentericus, situated in the adventitial connective tissue of the arteria ileo-ceco-colica. These nerves are situated immediately above the tunica media in the adventitia of the arteries of the intestine. The irritation caused by the migration of the nematodes causes the formation of dense fibrillary connective tissue layers. This causes atrophy of the nerve-fibers which are surrounded by the scar tissue. To a large extent the axis cylinder disappears, with the result that secretory and motory disturbances

*Olt, A. 1932. Das Aneurysma verminosum des Pferdes und seine unbekannten Beziehungen zur Kolik. (The aneurysma verminosum in horses and its relationship to colics.) Deutsche Tierärztl. Wochenschr. 40(21):326-332. Abst. by F. Volkmar.

of innervation will occur on the jejunum, ileum, cecum and colon.

The atrophy of the nerves increases from the pressure and tension upon the scar tissue of the adventitia and its enclosed nervus plexus, with the increase of the aneurysma.

Thrombosis and embolism of the aneurysma does not cause as many losses of horses by far as does the chronic inflammatory process of the adventitia of the vessels and of the nervous plexus.

Unusually severe infestation with strongylids may cause acute inflammatory processes, complicated with edema in the region of the mesenteric plexus and may have a paralyzing effect upon the nerves of the intestine.

With very few exceptions, colic of the horse due to parasitism is almost always due to *Sclerostomum bidentatum.*

Copper salts are not poisonous to strongylids and are, therefore, not efficient in the treatment of equine sclerostomiasis.

An Improved Tuberculin

Anaesotuberculin[2,3] is obtained by cultivating tubercle bacteria upon glycerol bouillon. The culture bouillon is filtered through a simple filter; the germs are killed by the addition of formalin (5%). Heating and evaporation become, therefore, superfluous and injury to the specific characteristic of the toxin is avoided. The advantage gained in its preparation is one of time and economy. The Anaesotuberculin will produce an intensive and quick thermoreaction with a dosis of 2½cc. Regardless of the stage of the disease it is capable of producing a reaction in any tuberculous animal within 6 to 10 hours (exceptionally in 14 hours). Sensitation to Anaesotuberculin does not take place. The reaction can be reproduced within a few hours after the fading out of the previous reaction. Used intrapalpebral, the Anaesotuberculin combines the advantages of the raw tuberculin in the local and subcutaneous test, preventing errors and disappointments. For diagnostic purposes its action is superior to any other tuberculin. Its application is especially indicated on account of the definite results from the palpebral test and the absence of disturbed milkflow or other after-effects.

[2] Baboni, N. 1931. Nove ricerche sull' anaesotuberculina bovina. (Recent experiments with Anaesotuberculin of the bovine type) Ann. Igiene 41:80-85.

[3] Baboni, N. 1931. Beitrag zur Anwendung des Anaesotuberculins in der Diagnostik der Rindertuberkulose. (Diagnosis of Tuberculosis in cattle by means of Anaesotuberculin.) *Deutsche Tierärztl. Wochenschr.* 39:20-23.

The Diagnosis of Psittacosis

In their[4] attempt to differentiate the symptoms and lesions of psittacosis in parrots from the symptoms and lesions of parrot diseases of different etiology, the authors have reviewed the world's literature on diseases of parrots and discuss these diseases in outline form. *Gout* has been observed after excessive doses of Yohimbin and from repeated feeding of meat and eggs. *Arteriosclerosis* has been found in the aorta descendens, A. brachiocephalica and Aorta ascendens. In *fowl-cholera,* hemorrhages into the intestinal wall and necrotic areas in the liver have been reported from parrots. Identical lesions occur also in psittacosis. The finding of *Pasteurella aviseptica,* or inoculation of pigeons will clarify the differential diagnosis. All three types of *tuberculosis* (avian, bovine and human) may occur in parrots. Tuberculosis, however, is easily differentiated from psittacosis. *Paratyphus,* formerly suspected to be the cause of psittacosis, is also easily differentiated by the finding of enteritis bacteria. *Erysipelas* may also occur in parrots. Bacteria, morphologically, culturally and serologically resembling *Bacterium rhusiopathiae* have been found in a parrot from a zoological garden. *Avian pox* lesions have been reported from parrots. *Fowl plague,* too, affects parrots. The course of the disease as a rule is rapid while psittacosis usually takes a longer course. Mice are not susceptible to fowl plague, but psittacosis is fatal to them. The *virus disease of Pacheco and Bier* is a disease of parrots, not transmissible to man. *Aspergillosis* is differentiated by the finding of the characteristic mycelium. Disease con-

[4] Ekeles, G. and Grzimek, B. 1932. Die Psittakose unter besonderer Berücksichtigung der veterinären Differentialdiagnose. (Psittacosis and its differential diagnosis in parrots) *Tierärztl. Rundschau* 38(44):761-765; (49):847-850.

ditions in parrots may also be caused by nematodes, cestodes, trematodes, protozoa and ecto-parasites.

The diagnosis of psittacosis may be made when one or more persons in a family succumb with a characteristic pneumonia and when the disease in the parrot can not be ascribed to a different disease, and when it is possible to infect parrots or mice with human blood or sputum or parrot organs which have been made free from bacteria and when the experimental animals upon autopsy show—in the absence of bacteria—certain histopathological lesions, especially in the liver. The finding of "L.C.L. bodies," the bodies described by Coles, Levinthal, Lillie and Rivers may also be considered a positive finding.

The symptoms of spontaneous psittacosis in parrots are a quiet behavior, a puffed-up appearance, the eyelids half shut, accelerated respiration, inappetence, chills, severe diarrhea, occasional vomiting. Other symptoms are wing respiration, groaning, obstruction of the respiratory apparatus with mucus, spasmodic sneezing, nasal catarrh, spasms from swallowing and hoarseness. Shortly before death the parrots are unable to roost, nervous disturbances and atactic movements occur. Coma and convulsions announce the fatal end. Some of the animals may recover and become virus-carriers for a long time. Autopsy reports from artificially caused epidemics are as follows: Injection of the vessels and inflammatory processes in the region of the intestines; enlargement of liver and spleen very frequent. The liver exhibits numerous miliary necrotic areas. Icterus in about 4.5% of the cases, enlargement of the heart in about 7.5% and induration of the lung in about 6.5% of the cases. Of special significance, microscopically, was the activation of the stellate cells. The cause of the disease is a filtrable virus found in the organs, the blood, sputum, saliva and in the feces.

Meyer has found psittacosis widespread among parokeets in Southern California. Many apparently healthy birds are carriers of the infection. Such birds are the chief source of the infection causing sporadic outbreaks of psittacosis in the United States. He has identified the disease in birds of other than the parrot family. In one case in a canary.

Blood Groups in Animals

According to the law of Landsteiner, only the physiologically possible combinations of bloodcorpuscle and serum properties, that is, combinations which do not influence each other, will always occur in the blood of man. Thus the following structures will result for the four blood groups of man: (1) O-alpha beta, (2) A-beta, (3) B-alpha, (4) AB-o. The author found that this rule does not strictly apply to domestic animals. In horses, for instance, the same four blood groups as in man are found, but in addition to O-alpha beta, the group O-alpha, O-Beta and O-o combinations occur; in addition to A-beta, the groups A-o, and in addition to B-alpha, the group B-o will be found. Moreover, side-groups, like AB-alpha, AB-alpha beta, A-alpha beta, which one would expect to influence each other, were observed. In conformity with the blood of man, the blood of horses[5] has two types of A-bloodcells and two types of alpha-serum, a supersensitive A_1 and a less sensitive A_2; a powerful alpha and a weak $alpha_1$. The supersensitive A_1 reacts also toward the weak $alpha_1$, the less sensitive A_2 reacts also toward the powerful alpha. The author discovered also two new blood corpuscle properties and two opposite serum properties which he designated tentatively X and Y, and anti-X and anti-Y. He calculated that altogether 24 structures are possible in the blood of horses, which number really can be augmented by the presence or absence of the respective agglutinins. Thus 60 different structures were found among 80 horses. In the blood of pig and cattle, in addition to the agglutinable blood corpuscle property A and its opposite serum characteristic alpha, the Agglutinogen - Agglutinin pair B-beta was demonstrated. In addition to the group A-o and O-alpha, the group O-o, that is, a group in which neither a blood corpuscle nor a

[5] Schermer 1932. Neues über die Blutgruppen bei den Haustieren. (Newer knowledge concerning blood groups among domestic animals) *Tierärztl. Rundschau* 38(50): 859-861.

serum property is demonstrable, does occur. The crossing of pigs carrying O-alpha and O-o characteristics and of pigs carrying A-o and O-o characteristics enabled the possibility of determining the hereditary outcome. Among 135 families with 511 descendants it was found unmistakably that the serum property alpha is genetically conditional; it is dominant over O and it is hypostatical toward A. In the presence of A it does not appear as phenotype, although it may be present as genotype. The significance of these findings for the iso-agglutinins of man are further discussed.

Mastitis

In recent experiments[6] at the New York State Agricultural Experiment Station at Geneva, this compound gave such encouraging results in comparison with other dyes studied as to justify a more extended investigation.

Some difficulty was at first encountered in the choice of a carrying agent for the dyes that would be non-toxic to the udder tissues. Physiological saline appeared to be too concentrated and probably dehydrating to the mammary cells, while distilled water, being rapidly absorbed, resulted in rupture of the secreting cells. Synthetic milk, aside from the difficulty of introduction, produced a toxic reaction in the animal, the quarter soon yielding a purulent and bloody discharge and never returning to normal secretion. Ringer's solution brought about a violent reaction and a quick drying up of the quarters. A solution of 0.12 per cent sodium chloride and 3.5 per cent lactose was finally selected as less unsatisfactory than any of the others for the introduction of the dyes.

The substances tested yielded various results. Crystal violet, brilliant green and acriflavine were unsatisfactory, being either too violent in their action or too negative in their effects. Acriflavine was less toxic, but its results were not impressive. The azamine solution, on the other hand, was striking in its non-toxic effect on the tissues and the prompt elimination of streptococci from the milk.

A grade Holstein cow which discharged streptococci daily and gave all the symptoms of typical mastitis was injected with 250 c.c. of a 0.5 per cent solution of azamine, which was allowed to remain in the udder for six hours and then emptied. The first milk withdrawn thereafter was found to be a deep pink, but after 18 hours gradually returned to normal. No harmful effects to the udder were in evidence. The total count of bacterial flora was greatly reduced and the streptococci practically banished from the milk.

In a second cow with an excessively high number of streptococci the organisms appeared to have been eliminated after one such irrigation with azamine.

Field experiments with 92 quarters affected with chronic mastitis showed nearly 75 per cent definitely benefited.

The highly penetrating properties of the azamine compound were demonstrated in necropsies on two cows a few hours after udder inflation.

It was concluded from these experiments that the use of azamine as an udder irrigant showed considerable promise in treating mastitis in the early stages, and that further work might enable its efficiency for the more advanced types to be increased.

Obstruction of the Esophagus in Carnivorous Animals and Its Treatment

Housset[7] in this thesis opens with the statement that esophageal obstruction in the domestic carnivorous animals is a frequent occurence as is proved by the many reports of such occurrences.

After recalling the principal works which indicate the progress accomplished he broaches the anatomical and physiological study of the esophagus.

Connecting the pharynx to the stomach, the esophagus is a membraneous conduit which spreads in an extensive design in the

[6] Hucker, G. J. and Lee, Dorothy A. 1932. The use of certain Dyes in the Treatment of Mastitis; Technical Bulletin No. 205; New York Agricultural Experiment Station.—Abst by C. E. DeCamp.

[7] Housset.—Contribution à l'étude de l'obstruction oesophagienne chez les carnivores et de son traitement. (Thèse, Toulouse 1931). Revue Des Publications, Revue Vétérinaire et Journal de Médecine Vétérinaire et de Zootechnie, February, 1932. p. 101-2-3. Abstracted by J. G. Horning.

cervical and thoracic regions. It bends from the left side of the trachea to the entrance of the chest and takes up again its middle position. In the thoracic cavity it is crossed on the left by the posterior aorta and itself crosses on the right, the left bronchus.

Examined after a fatty injection, this conduit presents four strictures due to the compression, which the organs, with which it is in relation, exercise upon it. In going from the front to the back one finds: a cricoiden stricture, situated at the beginning of the esophagus at the back of the cricoid; an aortic stricture at the point of the crossing of the posterior aorta; a bronchial stricture due to the compression of the left bronchus, and finally a diaphragmatic stricture at the point where the esophagus perforates the diaphragm.

The esophagus recevies the alimentary bolus discharged by the pharynx, pushing it slowly by the contraction of its muscular fibers, striated or smooth, into the stomach. The active cause of the stopping of foreign bodies, being the spasm of the muscular fibers, it is logical to admit that it is in the regions where this musculation is more developed, that is to say, in the sphincter region superior and inferior, that the foreign bodies are stopped most frequently. In the middle portion of the conduit, the stoppage of the foreign bodies is more rare and when it occurs, it is generally at the point of the crossing of the posterior aorta.

The diagnosis of esophagus obstruction is often difficult. The X-ray or fluorscope examination when it is possible, is extremely fine. The catheter furnishes useful information when the foreign body completely fills up the opening of the esophagus; in the other cases it furnishes only approximate information. This technique is even dangerous if the foreign body is prickly or has rough edges.

The symptoms are characterized above all by signs of distress accompanied by dysphagia.

The treatment consists either in the administration of vomiting medicaments (apomorphine), evacuants (pilocarpine), or antispasmodic (atropine), or in surgical intervention.

The extraction consists essentially in the mobilization rather than in the extraction of the foreign bodies. The method of choice consists in extracting the bodies under the fluorscopic screen following the technique of Taskin.

Simple espohagotomy in the cervical region at the point of stoppage of the foreign body is used.

Transmediastinal esophagotomy and gastrotomy are rarely used.

Finally esophagoscopy extoled by American authors does not seem to have produced positive results.

Observations reported by the author show a certain number of consecutive complications in the presence of foreign bodies: perforation of the aorta, purulent pleurisy, fistula of the neck, suffocation, and the good results obtained by forcing back with the bore or direct extraction with the forceps.

Non-Specific Protein Therapy in Canine Distemper

Neilsen[8] reports an observation on Omnadin in the treatment of canine distemper in which he kept a record of more than 600 cases in which this therapeutic agent was used.

On the whole, the results were not quite so favorable in the cases treated in the hospital as in those treated in his ambulatory practice. It is thought that this difference was due to the fact that cases brought to the hospital are ordinarily farther advanced than those seen in the homes. However, in spite of the advanced stage of the disease presented by many of the animals brought to the hospital, the results were quite good, even in many cases presenting severe complications. Only in the nervous type of distemper was Omnadin without apparent effect.

Where pneumonia or other complications were present, the animals were treated symptomatically, the Omnadin being used in addition to the usual treatment. In fact, this plan was followed in the treatment of all

[8] Moltzen-Nielsen, Omnadin und Hundestaupe, *aus Maanedskr. f. Dyrlaeger*, 1932, H. 12, S. 321.

cases except that in those presented in the early stages of the disease, where the diagnosis was difficult and somewhat uncertain, Omnadin alone was used. So strikingly successful was Omnadin therapy in early cases that after a time the author adopted the policy of injecting it into all young dogs showing eye symptoms and having a temperature of 104° F. or above. Such dogs were given 1cc of Omnadin into the gluteal muscles; small puppies 0.5cc, very large dogs 2cc.

Of course, the author cannot be sure that all the cases were distemper, but the history and symptoms were those upon which a tentative diagnosis of distemper is ordinarily made by veterinarians.

After the injection of the Omnadin, the temperature falls in 12 to 36 hours to about 101.5° F. The animal becomes more lively and starts to eat. Occasionally the temperature rises again, but seldom beyond 102.5° F. to 103.° F. This is the signal to repeat the injection of Omnadin. In fact, since the remedy is entirely harmless, the author after a time adopted the routine of repeating the injection of Omnadin after two or three days, and if the temperature was not normal at that time, to give a third dose two days after the second injection. In a large majority of the cases treated in the early stages the temperatures remained normal after the first injection.

The usual symptoms of canine distemper such as discharge from the eyes and nose, cough and gastro-enteritis, when they occurred were treated symptomatically. It was unquestionable that distemper ran a milder and shorter course in animals that have received injections of Omnadin and usually recovered without showing any of the after effects. Sometimes in cases receiving the injection in the early stages the disease was definitely arrested or aborted by the treatment. In others, it ran a typical mild course with catarrhal symptoms. Only in very rare cases was paraplegia shown.

Omnadin is described as a lipin-proteid compound. The injection causes no local reaction and repeated doses resulted in no shock. The same preparation is used extensively in human medicine. Omnadin therapy in canine distemper is essentially a non-specific protein therapy.

THE FANCY MOUSE INDUSTRY

Four hundred breeders of fancy mice and rats are registered by the (British) National Mouse Club, which is the central organization of the fancy. On the average, the larger breeders keep about 1,000 mice; one member has a stock of 5,000. The values of the best exhibition mice range from 15s. to £5 each; 25s. is the average price of a well-marked trio. The recent experiments on the use of mice pelts for gloves and fur coats have given satisfaction, and the possibilities of developing the fancy into a branch of the fur industry are being explored.—*The Veterinary Journal.*

THE RABBIT INDUSTRY IN GREAT BRITAIN

When the British Fur Rabbit Society was founded 14 years ago, the majority of owners were breeding the "fancy" rabbit for exhibition. However, after the war, the breeding of utility rabbits for wool, fur and meat advanced rapidly and the owners established their cooperative society for the sale of pelts. The present membership of this society (Fur Board, Ltd.) is about 3,000 registered breeders. In 1929, the National Rabbit Council was founded to coordinate the interests of the rabbit industry and to promote scientific research. Between them these three organizations watch over the interests of a young but very active industry possessing approximately 850,000 rabbits. There are large numbers of owners each of whom feed several hundred rabbits, and the stock of some farms number more than a thousand. The current value of the winning exhibition rabbit varies from £10 to £30 each, and of good pedigree utility rabbits from £1 to £3 each. Ordinary meat stock sell at 2s. to 3s. each, wholesale.

By 1928 the sale of pelts by Fur Board, Ltd., increased to £13,356; since then its sales have declined owing to the economic depression and to intensive foreign competition. The Angora wool crop increased from £290 in 1922-23, to £12,520 in 1926-27, when approximately 100,000 Angora rabbits

were being fed in this country. In recent years Smithfield market has sold annually from 20,000 to 24,000 cwt. of home-produced wild and tame rabbit carcasses, of which appreciable quantities have been the by-product of the fur industry.

Britain has been paying to the foreigner some £1,500,000 per annum for rabbit products. With some slight fiscal assistance from Government, the leaders of the rabbit industry anticipate that the country's requirements of fur, wool and meat could be supplied largely from home bred stock. The industry could very quickly expand to an estimated minimum annual value of about £5,000,000; if such a development takes place the rabbit will become one of the principal stock-raising industries of the country.—*The Veterinary Journal.*

ARTERIO-SCLEROSIS NOT DUE TO ALCOHOLISM

Use of alcohol is not a cause of arteriosclerosis or hardening of the arteries since many different animals have been known to contract the disease, Dr. Herbert Fox, Director, Pepper Laboratory of Clinical Medicine, University of Pennsylvania, told the 38th semi-annual meeting of the Veterinary Medical Association of New Jersey.

Doctor Fox revealed that parrots, rabbits and storks were the most susceptible to the malady and that it is seldom found in mammals.

THE PIGEON INDUSTRY IN ENGLAND

There are between four and five million racing pigeons in this country (Great Britain); approximately one million rings for young birds are sold each year to registered members of the racing federations. There are 4,000 racing pigeon clubs with a total membership of approximately 80,000 fanciers, and it is estimated that there is an equivalent number of racing pigeon fanciers who have not registered with any of the clubs. Squeakers from well known lofts are sold at prices ranging from 15s. to £5 each. Birds which have accomplished extraordinary performances are frequently sold for £25, £50 and even for £100 each; £255 is the record price paid for the winner of the National Flying Club's race from San Sebastian. There is a valuable export trade since the British racing pigeon is regarded as the best in the world. The French and American Army Pigeon Services recruited their stocks in England. There are approximately 90,000 fancy or exhibition pigeons in the country. Prize winning birds sell for £25 to £50 each; higher prices have been paid for exceptional birds.—*The Veterinary Journal.*

THE FUTURE OF VETERINARY PRACTICE

Owing to conflicting opinions regarding the increase or decrease of small animals in the Metropolitan area, and also to determine whether veterinarians are decreasing or increasing in the same area, the Veterinary Medical Association of New York City, at the direction of President McKim, appointed a committee to make a survey of veterinary conditions and make recommendations. The report is as follows:

We have felt that it would be best to endeavor to ascertain the number of practitioners, whose work comprises 75% small animals, principally dogs, who are in the New York Metropolitan area, or who have come into the Metropolitan area during the past ten years.

While this report is not 100% accurate, we sincerely believe that it is at least 95% accurate and that it gives a fairly clear picture of the veterinary situation from the standpoint of the small animal practitioner in the Metropolitan area. We have ascertained the number of dogs, the increase or decrease of same, from the year of 1922 up to and including 1931.

In 1922, in the Metropolitan area, there were 136,002 licensed dogs, and 47 practitioners. We feel that the veterinary practitioner is interested in licensed dogs only, believing that the individual who will not license his dog is not of very much value to the practitioner. These dogs divided among the 47 practitioners would average to each practitioner, about 2,893 dogs.

Ten years later, 1931, we have an increase of dogs to 291,167, and 126 small animal practitioners, thus giving to each practitioner an average of 2,310 dogs. The result shows a loss of 584 dogs per practitioner.

Your Committee feels that with the large number of veterinary students enrolled in the veterinary colleges, many who come from the cities and are planning to enter the small animal field, that a chaotic situation will be brought about unless we take remedial measures. We feel that an influx of these men who will unquestionably enter the small animal field will do a great deal of harm to the practitioners al-

ready established and that many of these new men, unable to derive a substantial livelihood from their profession, will of necessity, engage in measures unbecoming to professional men, tear down and destroy the structure which the older practitioners have created for them.

We can point with alarm to mistakes that have been made in the profession, human medicine, and we feel that if we can interest men of vision and courage to see our viewpoint, that we might do much to stabilize veterinarian practice and our splendid veterinary colleges.

We note that the various associations in the province of Quebec, Canada, control the entrance to the professions. Last year there were fifty applications for admission to the veterinary school of whom twelve were selected by the veterinary association.

We believe that there is a great deal of merit in limited enrollment, having in mind, the need for the profession and the disadvantages of an oversupply to both the profession and the public. The question has come up that the state schools supported by public taxes must accept all students who have the necessary qualifications. We do not believe that this is so; we believe that the schools have certain facilities and funds which will permit them to educate properly a limited number of men, and we believe that satisfactory arrangements can be made to avoid exceeding their capacity. In other words, a definite limit should be placed on the number of students that may be admitted to the veterinary schools from year to year, and the entrance requirements ultimately raised to two years of pre-veterinary collegiate work as an entrance requisite.

We can point, as an example, to the United States Military Academy, at West Point, and to the Naval Academy, which permit a certain number of men from each congressional district to enter, and which set a limit on the number entering. We feel that if this can be done by the governmental schools, it can be done also by the state supported veterinary schools.

Because of the large number of men who have been permitted to enter and graduate as physicians, medicine is today paying the price. Here are some significant facts about American public education from the Federal Office of Education, on statistics of state school systems.

Enrollment in American High Schools increased 99 9/10%, between the years of 1920 and 1930. While in 1900 the chances of a boy or girl going to college were only 1 in 33, today the ratio is 1 in 6.

Dr. Fernand Decourt of Paris, secretary of the International Association of Physicians, is responsible for the following: "The physician's lot has become a difficult one, with thousands of young physicians graduating each year, and with new and improved hospitals and free clinics in every country of the world.

"Also, with the decline of quackery and the rise of standards both in practice and in the granting of degrees, doctors have become more discriminating and the International Association may suggest some kind of a quota based on city and country population, and with the free clinics and hospitals in mind."

According to Dr. Decourt the average doctor should supply a field of about 1,400 to 1,500 persons.

United States physicians have an average of 1,326 population per practitioner.

Your committee would like to ascertain the number of dogs for which one veterinary practitioner can supply adequate service.

Again, there are approximately 152,000 physicians and surgeons in America, and according to a survey financed by the Julius Rosenwald fund, the average income of 40,000 of these physicians is less than $2,500.00 a year.

What does the future hold for the small animal practitioner?

The future of the small animal practitioner lies with the practitioner, college entrance boards and the local, state and national veterinary associations.

This committee feels that a serious error is being made by all veterinary associations, in not having permanent veterinary economic committees to deal with that phase of veterinary medicine so important in the last analysis to all of us, "Veterinary Economics." We feel that if medicine can more than justify the existence of a permanent committee of Medical Economics, that we should do likewise.

We find no shortage of veterinarians in the Metropolitan area, but an alarming surplus, and this overcrowded condition we feel, is due primarily to lack of accurate information, disseminated to and through the veterinary profession.

We know that during the past ten years many lucrative practices were built up and we feel that this will continue if our schools are not permitted to cause a surplus of veterinarians. Your committee was surprised to learn that the veterinary school authorities in Spain had decreed that all veterinary students must have a baccalaureate degree—then take a five or six years veterinary course before qualifying for practice.

Summary

1. The responsibility for an oversupply of veterinarians rests squarely upon the veterinary schools who have not limited enrollment and who have not raised their entrance requirements.

2. If the cry of a shortage of veterinarians should ever come up again, surveys should be made by city and state veterinary associations and the A. V. M. A. to ascertain the actual conditions.

3. We believe that there exists an oversupply of veterinarians (small animal practitioners) in most of the larger cities, and that if surveys should be made in all large cities much valuable information would be obtained.

4. In all local and state associations and in our National Association, a department of Veterinary Economics should be formed, dealing exclusively with the economic end of veterinary medicine.

5. We feel that an oversupply of veterinarians is far more of a menace at the present time than a shortage of veterinarians.

6. We believe that all state veterinary associations should prepare to raise and revise their veterinary practice acts to conform with the higher requirements of the present for the practice of veterinary medicine.

SELL TO HIGHEST BIDDER

Your cows are grain buyers—some bid high, some low. If a grain buyer offered as little as some cows pay for the grain they eat, the owner would feel like writing to Washington about it. Are you going to let these "boarder cows" continue to buy your grain? Why not dispose of these low producers and give the cows that pay a high price for the grain they eat a chance to buy all your grain?—Ray Lange in *Hoard's Dairyman.*

GREAT DECLINE IN BOVINE TB REVEALED BY MEAT INSPECTION RECORDS

Less than one-third as many cattle slaughtered under Federal meat inspection during the year ended June 30, 1932, were affected with tuberculosis as were found in a similar period ten years ago. The total number of cattle inspected was practically the same, being 7,793,878 in the fiscal year 1932 and 7,795,323 in 1922. Cattle showing evidence of tuberculosis in 1932 numbered 38,446 as compared with 146,945 ten years ago. Since Federal meat inspection is recognized as a test of the health of market livestock, the comparative figures show the effectiveness of the nation-wide campaign of eradicating tuberculosis from livestock.

DECREASE IN TUBERCULOSIS OF SWINE SHOWN BY MEAT INSPECTION RECORDS

The percentage of carcasses more or less affected with tuberculosis during the last 25 years reached its high point in 1924 when 15.2% of the total number of hogs inspected under Federal supervision were classed as tuberculous. Advanced tuberculosis was found in 2.7% of the number. During the fiscal year ending June 30, 1932, the corresponding percentages were 11.4 and 1.59, respectively. The reduction is therefore about 40%. The decline in tuberculosis of swine is attributed partly to reduction of tuberculosis in cattle as a result of active eradication measures, and partly to the increasing attention that the control and eradication of tuberculosis in poultry has been receiving.

TABLE 1—TOTAL TUBERCULIN TESTING (INCLUDING RETESTS) OF CATTLE, BY STATES, UNDER THE COOPERATIVE TUBERCULOSIS-ERADICATION PLAN, 1917 TO 1932

State or Territory	Cattle tested	Reactors
Alabama	785,799	2,550
Arizona	379,850	8,039
Arkansas	200,067	572
California	988,463	20,107
Colorado	125,237	2,678
Connecticut	913,207	55,663
Delaware	298,367	17,337
District of Columbia	15,303	124
Florida	574,549	4,566
Georgia	641,821	3,526
Idaho	962,826	4,692
Illinois	8,247,699	246,493
Indiana	3,011,172	30,678
Iowa	9,641,774	209,477
Kansas	1,859,046	14,579
Kentucky	975,913	6,643
Louisiana	506,741	9,541
Maine	879,807	8,220
Maryland	1,447,637	62,969
Massachusetts	792,850	86,479
Michigan	5,205,916	67,360
Minnesota	8,196,477	134,938
Mississippi	438,259	1,595
Missouri	1,429,193	8,392
Montana	1,136,401	7,596
Nebraska	3,254,115	33,447
Nevada	235,557	2,271
New Hampshire	861,243	38,435
New Jersey	733,390	50,952
New Mexico	135,562	910
New York	8,492,587	571,511
North Carolina	885,884	4,059
North Dakota	2,915,903	26,621
Ohio	4,240,327	91,174
Oklahoma	454,126	4,494
Oregon	1,567,865	13,543
Pennsylvania	5,012,225	215,477
Rhode Island	98,060	13,477
South Carolina	427,364	1,662
South Dakota	1,081,606	17,443
Tennessee	823,476	3,045
Texas	671,320	5,991
Utah	776,557	6,457
Vermont	1,886,424	72,068
Virginia	1,221,847	14,982
Washington	1,781,974	35,574
West Virginia	738,784	5,769
Wisconsin	11,624,340	179,751
Wyoming	183,204	1,323
Alaska	3,951	72
Hawaii	113,986	2,365
Interstate testing [1]	2,215,544	10,503
Indian Schools [2]	413	27
Purebred in U. S. [2]	4,486	157
Total	102,096,494	2,438,474

[1] Includes testing for fiscal years 1927 to 1932 only.
[2] Testing in U. S. before work was organized by States.

TABLE 2—ANNUAL RESULTS OF TUBERCULIN TESTING OF CATTLE IN THE UNITED STATES UNDER THE COOPERATIVE TUBERCULOSIS-ERADICATION PLAN, 1917-1932

Fiscal year	Cattle tested	Reactors	
		Number	Per cent
1917	20,101	645	3.2
1918	134,143	6,544	4.9
1919	329,878	13,528	4.1
1920	700,670	28,709	4.1
1921	1,366,358	53,768	3.9
1922	2,384,236	82,569	3.5
1923	3,460,849	113,844	3.3
1924	5,312,364	171,559	3.2
1925	7,000,028	214,491	3.1
1926	8,650,780	323,084	3.7
1927	9,700,176	285,361	2.9
1928	11,281,490	262,113	2.3
1929	11,683,720	206,764	1.8
1930	12,845,871	216,932	1.7
1931	13,782,273	203,778	1.5
1932	13,443,557	254,785	1.9
Total	102,096,494	2,438,474	2.4

TABLE 3—GROWTH OF ACCREDITED-HERD WORK 1918-1932

Fiscal year	Accredited Herds	Cattle
1918	204	6,945
1919	782	19,021
1920	3,370	82,986
1921	8,201	193,620
1922	16,216	363,902
1923	28,526	615,156
1924	48,273	920,370
1925	72,383	1,275,063
1926	96,392	1,577,087
1927	130,476	1,855,072
1928	169,356	2,265,933
1929	170,995	2,280,043
1930	182,858	2,646,686
1931	156,599	2,619,261
1932	174,648	2,863,434

TABLE 4—COMPARATIVE RECORD OF REACTORS SLAUGHTERED

Fiscal year	Number of reactors slaughtered	Condemned as unfit for food Number	Per cent	Sterilized Number	Per cent
1923	107,250	12,758	11.9	1,547	1.4
1927	289,662	27,627	9.5	2,706	0.9
1930	215,524	16,286	7.6	3,242	1.5
1931	213,829	14,331	6.7	2,571	1.2
1932	244,973	20,858	8.6	4,026	1.6

TABLE 5—RECORD OF TUBERCULIN TESTING BY STATES
Fiscal Year 1932

State or Territory	Herds tested	Cattle tested	Reactors found	Per cent reactors	Infected premises
Arizona	675	24,598	571	2.3	191
Alabama	31,526	142,764	132	0.09	69
Arkansas	5,991	54,605	19	0.03	15
California	8,560	203,632	12,837	6.3	1,653
Colorado	122	7,681	86	1.1	25
Connecticut	10,252	147,552	5,219	3.5	1,130
Delaware	3,735	47,505	701	1.5	306
District of Col.	2	575	0	.0	0
Florida	7,885	150,919	294	0.2	39
Georgia	24,300	111,524	184	0.2	86
Idaho	7,297	94,406	227	0.2	143
Illinois	102,846	1,197,084	12,234	1.0	4,641
Indiana	17,133	196,513	1,016	0.5	417
Iowa	61,797	1,096,930	22,411	2.0	7,383
Kansas	8,122	112,416	565	0.5	351
Kentucky	27,630	118,321	122	0.1	88
Louisiana	669	20,680	588	2.8	170
Maine	6,074	62,200	363	0.6	183
Maryland	21,112	222,715	2,720	1.2	1,244
Massachusetts	18,982	221,104	22,588	10.2	3,914
Michigan	78,384	705,139	1,210	0.2	711
Minnesota	57,395	1,036,701	5,842	0.6	2,949
Mississippi	8,151	67,732	49	0.07	20
Missouri	12,734	114,317	250	0.2	83
Montana	4,459	109,991	234	0.2	71
Nebraska	13,950	211,115	799	0.4	473
Nevada	834	23,793	30	0.1	11
New Hampshire	19,375	188,483	6,746	3.6	2,079
New Jersey	14,004	185,840	15,570	8.4	2,327
New Mexico	2,073	33,284	192	0.6	93
New York	110,576	1,477,010	78,526	5.3	12,023
North Carolina	1,983	22,489	55	0.2	15
North Dakota	13,900	338,677	1,494	0.4	638
Ohio	64,541	512,997	2,220	0.4	1,073
Oklahoma	6,863	82,917	169	0.2	78
Oregon	17,649	146,079	470	0.3	238
Pennsylvania	74,752	702,373	31,728	4.5	7,578
Rhode Island	1,671	27,462	4,268	15.5	594
South Carolina	12,191	48,070	36	0.07	25
South Dakota	2,728	69,750	751	1.1	389
Tennessee	21,054	124,310	167	0.09	66
Texas	13,058	144,700	898	0.6	428
Utah	13,347	71,464	292	0.4	254
Vermont	13,964	296,036	10,615	3.6	1,591
Virginia	34,647	171,528	563	0.3	297
Washington	20,856	204,643	1,284	0.6	446
West Virginia	21,702	92,480	141	0.2	97
Wisconsin	91,789	1,699,206	6,274	0.4	3,530
Wyoming	866	16,248	113	0.7	66
Hawaii	556	17,252	482	2.8	120
Alaska	153	1,505	15	1.0	3
Interstate	24,204	266,242	485	0.2	Unknown
Total	1,139,119	13,443,557	254,785	1.9	60,414

TABLE 6—MODIFIED ACCREDITED AREAS, BY STATES, NOVEMBER 1, 1932

State	Total counties in State	Modified accredited counties Number	Per cent
North Carolina	100	100	100.0
Maine	16	16	100.0
Michigan	83	83	100.0
Indiana	92	92	100.0
Wisconsin	71	71	100.0
Idaho	44	44	100.0
Ohio	88	88	100.0
North Dakota	53	53	100.0
District of Columbia	1	1	100.0
Washington	39	36	92.3
Nevada	17	15	88.2
Utah	29	25	86.2
West Virginia	55	45	81.8
Illinois	102	83	81.4
Kentucky	120	94	78.3
Virginia	100	72	72.0
Iowa	99	70	70.7
Pennsylvania	67	47	70.1
Minnesota	87	61	70.1
South Carolina	46	31	67.4
Kansas	105	61	58.1
Oregon	36	19	52.8
Nebraska	93	49	52.7
Florida	67	25	37.3
Georgia	161	59	36.6
Tennessee	95	33[1]	34.7
Montana	56	19	33.9
Delaware	3	1	33.3
New Hampshire	10	3	30.0
Alabama	67	16	23.9
Maryland	23	5	21.7
Missouri	114	23	20.2
New York	62	12	19.4
Vermont	14	2[2]	14.3
Connecticut	8	1	12.5
Mississippi	82	10	12.2
Oklahoma	77	8	10.4
California	58	6	10.3
South Dakota	69	6	8.7
Massachusetts	14	1	7.1
Arkansas	75	5	6.7
Texas	254	10	3.9
New Mexico	31	1	3.2
Total	3,073[3]	1,502	48.9

[1] Not including part of 1 county.
[2] Not including 65 towns.
[3] Includes counties in States not listed and District of Columbia.

TABLE 7—CATTLE TESTED FOR INTERSTATE MOVEMENT 1921 TO 1932

By B. A. I. Veterinarians

Fiscal year	Cattle tested	Reactors Number	Per cent
1921	36,208	675	1.9
1922	35,485	653	1.8
1923	37,801	601	1.6
1924	41,419	661	1.6
1925	48,360	873	1.8
1926	72,860	1,513	2.0
1927	58,526	991	1.7
1928	50,263	768	1.5
1929	45,497	537	1.2
1930	41,299	263	0.6
1931	28,543	148	0.5
1932	39,159	87	0.2

By Approved Veterinarians

1921	242,708	3,999	1.2
1922	149,548	2,777	1.9
1923	200,636	2,447	1.2
1924	235,970	2,223	0.9
1925	279,199	2,278	0.8
1926	355,836	2,438	0.7
1927	382,432	2,219	0.6
1928	404,947	2,025	0.5
1929	419,377	1,538	0.4
1930	297,313	1,132	0.4
1931	221,105	492	0.2
1932	227,083	500	0.2

HUMANE ASSOCIATION CALENDAR

The Toronto Humane Society, Toronto, Canada, of which Dr. J. A. Campbell is a member of the Board of Governors, has issued "The Humane Calendar" for 1933. The first page of the calendar contains an illustration of the headquarters of the society in Toronto and a list of officers.

A large illustration of one of the common breeds of dogs is shown above the calendar for each month. These illustrations are reproductions of noted paintings and are splendidly done. Beneath each illustration is a short history and description of the breed as follows:

The English Bulldog

Originally bred and used for the express purpose of bull-baiting, a sport which was popular until its prohibition about a hundred years ago. This peculiar thick set type of dog is remarkable for its short broad muzzle, and general ferocious appearance. Its expression belies its temperament which is gentle and placid. A splendid watchdog, a good companion and a safe protector and playmate of children.

The Wire-Haired Fox Terrier

A very handsome symetrically built dog, full of courage and alertness, a loyal, playful companion, qualities which make him the most popular dog of the day. They differ from the Smooth-Haired Fox Terrier in that they have a harsh dense wiry coat.

The Chow Chow

First bred in Northern China, being a cross between a Samoyede and an Eskimo dog. It is a very distinguished looking animal and its habitual expression is a scowl. They have small piercing jet black eyes, a short muzzle and a blue tongue. The Chow, as it is usually called—is inclined to be truculent, does not easily make up with strangers.

The Sealyham Terrier

The Sealyham has many of the characteristics of the Wire-Haired Fox Terrier. They are shorter in the leg but longer in the body and have the same rough, wire-haired coat. Typical specimens should have a white body with markings only on the head. With their exceptionally mild disposition, intelligence and friendliness, they make an ideal companion for the country and a valuable pet for the home. As an exterminator of vermin they are second to none of any breed of dog.

Pointer

Essentially an English dog although its true origin is somewhat uncertain. It is one of the best sporting dogs and a favorite with hunters. A very sagacious animal possessing great intelligence, with a very keen scent, eager and willing to learn and a tireless worker. They usually work in pairs and it is characteristic of them never to touch game that has been shot, but to "point" when they have found it.

Setter

The three varieties of Setters, English, Irish and Gordon, differ mainly in the color of the coats. Sporting dogs noted for their intelligence, remarkable speed and ranging ability. They are capable and hard workers, and can withstand cold weather, consequently being great favorites with Canadian hunters.

The Pekingese

Distinctly Chinese like their name, and the oldest known pure bred dog of the world. Dating back to the early Chinese dynasties, and carefully guarded, it being a crime punishable by death to take one of these dogs out of China. The first specimen was introduced to England at the close of the Boxer rebellion in 1900.

They vary in size from the little "Sleeve" dog of three pounds in weight—so called because it was a habit of the Chinese to carry them in their sleeves—to a well developed specimen of ten pounds. They are very pugnacious, possessing amazing agility and quickness, are easily taught, very intelligent and make affectionate pets and are excellent watch dogs.

The Scottish Terrier

Sometimes called the "Aberdeen Terrier." Not only in its own country from whence it derives its name, but wherever known is a great favorite. The reason of his popularity is not far to seek for he is somewhat uncommon in appearance, neat and one of the best of pals. They are very little trouble to keep in order, their shaggy coat rarely presenting a ragged appearance. Possessing more than their natural share of intelligence and courage they are sometimes a little too ready to try conclusions with any other dog. They make an ideal pet.

The Airedale Terrier

Cousin to the Welsh Terrier but much larger in size, originally known as "Rough Haired Terrier." It is a first rate water dog, an excellent companion and extremely game, keen and active, possessing great vitality, strength, pluck and endurance. Makes an excellent guard and was proved one of the most reliable of the breeds used in the great war. Usually a one man dog, sagacious to a degree and an enduring affectionate companion.

The Alsatian Shepherd Dog

Commonly known as the Police dog. Famed for possessing intelligence to perhaps a greater degree than any other breed. Not a dog for the city; should be kept where there is room for them to use the tireless energy and activity they possess. They may be trained to do almost any task within their powers; are devoted to their owners and can be relied upon for obedience and faithfulness.

The Great Dane

Although originally from Germany, the Great Dane has made its home in England since the 17th Century. A jovial good natured dog, extremely companionable, level disposition, possesses great intelligence, and the advantage over other large breeds that the coat requires little attention. An ideal watch dog for the large country estate, ferocious in appearance but gentle and faithful.